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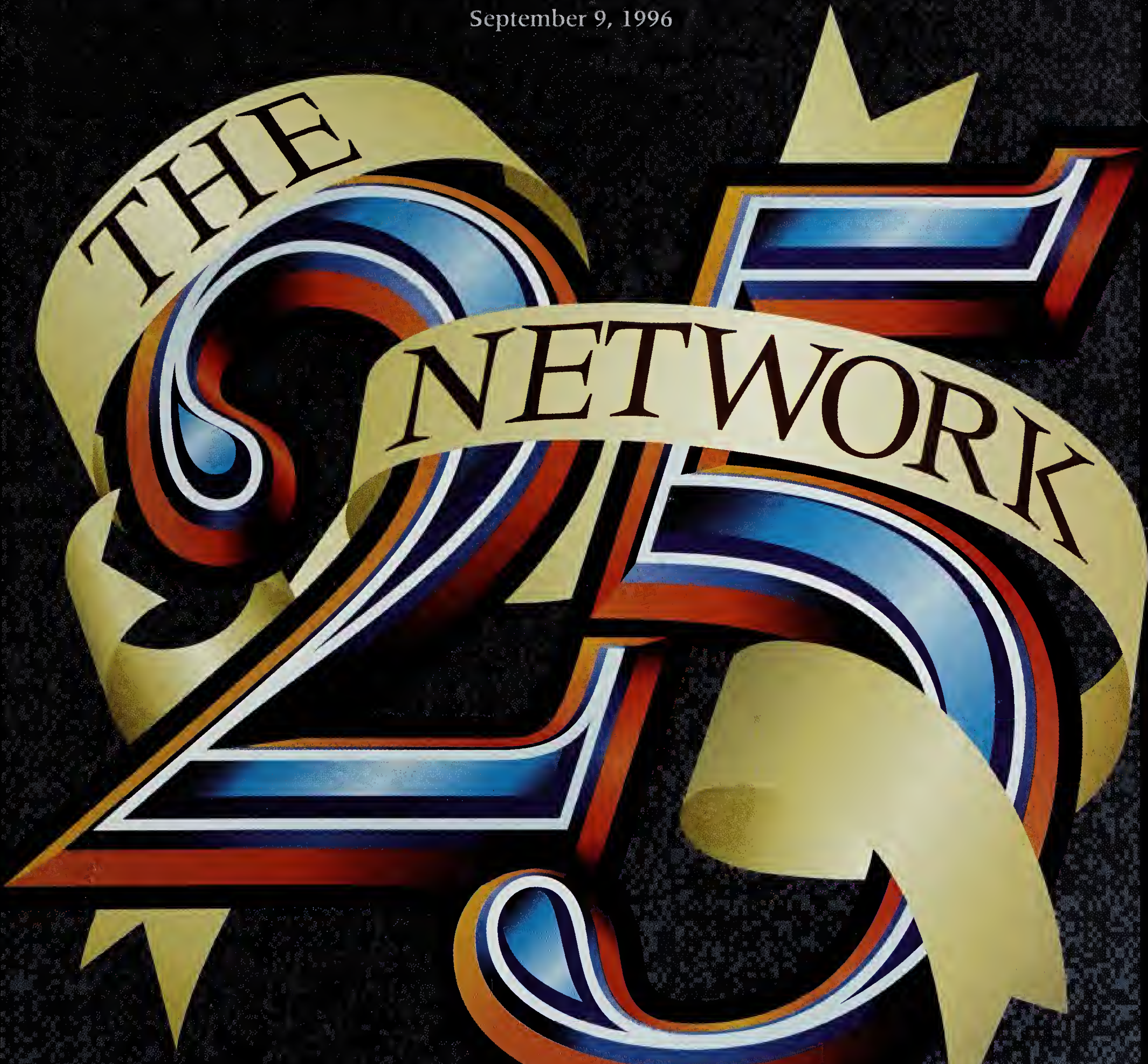

Outstanding users of networking technology from around the world

Produced in cooperation with *NetworkWorld*

Eric Benhamou
President & CEO, 3Com Corporation

3Com salutes the "Network 25."

When Marshall McCluhan first wrote about the "global village" in the 1960s, he foresaw a world brought closer together by strong communications providing access to information regardless of location. In this new world, traditional barriers of time and space would vanish–displaced by the power of access to computing, telecommunications and networking resources. This "Network 25" special supplement–a joint venture of *Computerworld* and *Network World*–profiles organizations around the globe which have dynamically employed network computing to turn this vision to their real world competitive advantage.

As information technology moves into the 21st century, network access to information will be much simpler and more affordable. Users will access data via dramatically faster networks, and information will combine text, graphics, audio and video. A fully open and deregulated environment will encourage connectivity that spans the globe, touching us all at work, home and play.

The organizations featured in this supplement are at the forefront in applying network computing to advance communications. 3Com proudly recognizes their vision, and their understanding of the value inherent in access to information technology.

Sincerely,

Eric Benhamou

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EDITOR'S note

Net Work

Welcome to the Network 25, a joint production of *Computerworld* and *Network World*. Nominated by editors in 18 countries and written by reporters from all four corners, our issue includes some outstanding and imaginative networking users.

Whether in Chicago, Sao Paulo or Johannesburg, these 25 companies face similar issues: How do we connect far-flung operations to create a true global organization? What does global telecommunications reform mean for our ability

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to communicate across international borders? What will the impact of the Internet and intranets be on the company's business?

No doubt, those are the same questions that keep you up at night too.

In some parts of the world, the issues are even more complex. In China, for instance, a central government sets policy. In Japan, culture and tradition have slowed the transition to a network-centric business model. South America and Africa share "emerging economy" issues. And Europe has a unique set of multicultural obstacles to overcome as it stumbles toward something resembling economic unification.

All the stories behind these 25 companies are relevant to your company, especially if you have or plan to have an international presence. Use them to benchmark your own networking capabilities.

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THE NETWORK 25

Outstanding users of networking technology from around the world

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Barclays, U.K.

Benetton, Italy

Black & Veatch, USA

Cemex, Mexico

Cervecerias Quilmes, Argentina

Charles Schwab, USA

CSX Transportation, USA

Federal Express, USA

First National Bank, South Africa

Fisher & Paykel, New Zealand

Geffen Records, USA

Maruti Udyog, India

Merita Bank, Finland

National Computer Board, Singapore

Petrobras, Brazil

Peugeot, France

Schindler Informatik, Switzerland

SmithKline Beecham, USA

START Informatik, Germany

Swissair, Switzerland

Tempus, Bulgaria

The Times of India

Executive **SUMMARY**

World-wise

Effective networking distinguishes these 25 global companies.

THE 25 COMPANIES LISTED on the facing page share one common characteristic: Every one is an innovator. Whether it's *The Times of India*'s commitment to creating the country's first major intranet application or Brazil's Banco Bradesco's eagerness to tap new technologies to expand its international business, these 25 firms are all pushing the networking limits.

Of course, business challenges differ. First National Bank in South Africa is adapting to a post-apartheid regime by expanding its banking network into new areas. Amoco Corp. is working to improve connections between oil exploration vessels and platforms in remote locations. And ABB Asea Brown Bovari Ltd., the $30 billion Swiss engineering company, must decide how to standardize communication among its roughly 1,000 companies in 140 countries without compromising their autonomy.

Still, some themes run through all 25 companies. Indeed, they resonate with all companies exposed to global competition:

- **Global Reach** *(page 20)*. Multinational firms are struggling with how to transform themselves into global companies. Global companies have well-integrated operations, whereas multinationals have stand-alone regional operations. Global networking buys companies higher productivity and close connections with their customers and suppliers.

Take Benetton Group SPA. The $1.9 billion Italian clothier is a virtual corporation that draws on the capabilities of 120 participating companies in 30 countries. The results speak for themselves: Both revenue and net profits were up last year.

At Black & Veatch Corp., the $1.1 billion engineering company with 80 offices worldwide, the challenge is to get information to engineers in remote locations to construct public utilities. The cost savings of effective networking can be counted in the millions of dollars, the company claims.

One of SmithKline Beecham PLC's networking initiatives is to improve supply chain management by the way its employees communicate with customers and suppliers. As one executive at the U.K.-based international pharmaceuticals firm puts it, "Any im-

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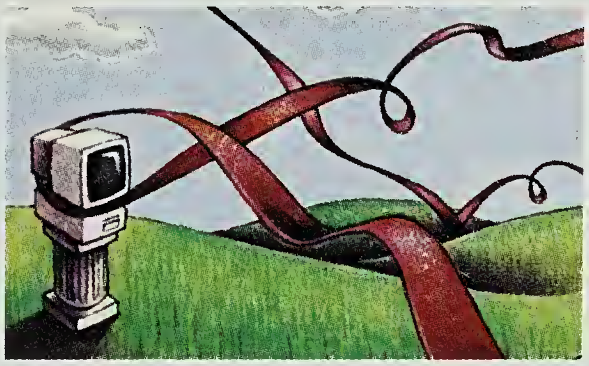

BETSY LYON

TECHNOLOGY PROFILES

To be nominated for the Network 25, companies had to excel in at least one of these technology areas. For the complete methodology, see page 49.

SWITCHED NETWORKS. Where traditional LANs require users to share capacity on network links, switched network technologies provide instantaneous connections between two networks' devices. That allows them to share information at much higher speeds. The link is maintained for only as long as the devices communicate, in much the same way that a telephone network supports a link between two phones during the duration of a call.

The way such connections are made depends on the network's architecture; most corporate networks today have so-called shared-LAN architectures, such as Ethernet or Token Ring. These technologies are running into capacity problems where bandwidth-heavy multimedia and collaborative computing applications are in use. Global networking leaders are deploying new technologies such as Asynchronous Transfer Mode (ATM) and switched Ethernet to support such new uses.

MOBILE/REMOTE COMPUTING. Using a computer off-site and connecting to the company network via modem, wireless technology or other means. One of its dirty little secrets: the inferior service access to applications and information its users get. Leaders here are using innovative techniques to put all corporate network users on equal footing and bring the power of networking to every aspect of the company.

Continued on page **8**

Betsy Lyon

TECHNOLOGY **PROFILES**

Continued from page **7**

Internet/intranets. The Internet, and its graphical component, the World Wide Web, is the interconnected tangle of global networks. Intranets are in-house networks that use Internet technologies but are protected from outsiders by firewalls. Both are having a profound impact on how companies provide service to their business partners, customers and internal users. Leaders are extending their businesses electronically to market, sell and support products; internally, they are simplifying operations through intranets. Such organizations are seeking easier access to information, applications and useful services.

Internetworking. Corporate networks today are really internetworks, a quilt of interconnected LANs and WANs that support a variety of applications and departments. Leaders in this area are deploying technologies such as routers, intelligent hubs and virtual LANs in innovative ways to make it easier for workers to collaborate on projects and allow leaner, flatter organizations to respond more quickly to changing market conditions. The internetworking arena itself is undergoing dramatic changes, as new high-speed technologies offer more options and as mergers and acquisitions change the competitive landscape. The top internetworking users are staying ahead of the curve, enabling their networks to support more users and network-intensive applications.

Network management. The area devoted to managing and controlling all the components on a network. Demands on the network grow exponentially, but the resources and skills to manage networks grow much more slowly. Technology, ironically, offers only a limited set of answers for network management problems. Leaders in this area have adopted new, intriguing approaches to managing their networks and the applications that reside atop them.

Groupware/collaborative computing. Software that automates a task among multiple workers or that helps workers anywhere in a company share information, work on projects and tap into the greater corporate knowledge base. Companies that build and deploy such applications outpace peers that may have spent billions building global information networks but use largely un-networked applications.

Global networking. Building a network that supports sites around the world. Leaders here know what it means to deal with differing regulatory requirements, wide-area network services, equipment suppliers, support offerings and labor markets. ●

Continued from page **7**

provement in communications [translates into] savings and competitive advantage."

- **Use of the Internet** *(page 31).* The Internet has the potential to change the economics of competition. The 'net allows small firms to meet millions of potential customers in a way that wasn't possible just a few years ago. And it breaks down international barriers: Companies worldwide can now compete with U.S. firms in their own backyards.

While the Internet helps them compete globally, intranets enable them to improve productivity. *The Times of India,* for example, is setting up the country's first major intranet in an attempt to streamline many business functions, further enhancing its ability to compete.

Another issue many companies face: how to save huge investments in software such as Lotus Notes in an increasingly Internet-centric world. ABB, with 50,000 Notes users, is figuring this out.

- **Telecom Reform** *(page 14).* One of the biggest question marks in any company's long-term networking strategy is the implications of global telecommunications reform. A truly international phenomenon, reform is at different stages in virtually every country in the world. Experts present any number of scenarios for how reform will unfold between now and 2000, the deadline for an international agreement set by the World Trade Organization.What to do in the interim? Don't sign too many long-term contracts.

- **Asia's Ascendance** *(pages 9, 26).* The Pacific Rim is a hotbed of networking activity. But all nations are moving at their own speed. Japanese companies, once considered invincible by their Western counterparts, are viewed as far behind when it comes to networking. But as the country emerges from recession, some progressive companies, such as Matsushita Electric Industrial Co. and Kao Corp., are proving the value of networking to their peers.

China is coming on strong with billion-dollar infrastructure investments planned for the next five years. Current investments are spotty at best, but cities such as Shanghai are making great strides in improving their networking capabilities. ●

Down but not out

Tom Wagner/SABA

Naotake Furukawa *says Matsushita's network expansion into China will save money and test new technologies*

UNTIL RECENTLY, the term "networking" in Japan was used solely to describe the expansive web of contacts necessary for success in a country built on personal relationships. Measured in stacks of business cards and empty bottles of hangover elixirs, your average Japanese office worker's network had little to do with PCs, Ethernet or domain names.

Still riding high from their success in the booming 1980s, Japanese companies in the early part of this decade were convinced their manufacturing prowess could sustain them forever. They did little to streamline their operations through PCs and networks.

"Until 1992 most Japanese businesses were quite complacent," says Shumpei Kumon, a member of several government information technology advisory groups and executive director of the Center for Global Communications (Glocom), a think tank in Tokyo. "They felt Japan and Germany had won and the U.S., like the Soviet Union in the Cold War, was the loser."

It was not to be. Japan sank into a recession and the yen hit record-breaking levels, squeezing profitability out of Japan's exports. Moreover, companies realized that Japan's vaunted lifetime employment system had actually created a herd of bloated, inefficient behemoths.

Meanwhile, the U.S. — where Vice President Al Gore had just proposed his National Infrastructure Initiative (NII) — appeared to be moving quickly ahead in the eyes of Japan's business and government leaders. Japan's former sense of invulnerability that prevailed at the height of its economic bubble now turned into a realization that the island nation might lose the race into the Information Age.

Sustained by *manufacturing success, Japan almost forgot to come to the networking revolution. Now it's catch-up time.*

By Rob Guth

"Japanese businesses' confidence was replaced by a sense of incapability," Kumon says. The companies saw the U.S. shift from "bashing Japan to surpassing Japan."

A February 1995 cover story in the international version of *Time* magazine summed it up: "Missed Connection: Japan plays catch-up on the information highway."

And what a frenetic catch-up it is.

In the roughly five years since news of Gore's proposal first hit the upper reaches of Japan's government, the country, in fits and starts, has embarked on a frantic bout of network building.

Down but not out

On the office level, that means LANs. Though Japan still lags far behind the U.S. in PC and LAN penetration, the PC market exploded last year, growing nearly 70% over 1994. Next year, nearly 50% of all companies will have LANs, nearly twice the number in 1994, according to market researcher IDC Japan Ltd.

On the global front, many of Japan's multinationals have quietly begun building and expanding high-speed networks that link their global diaspora of subsidiaries, affiliates and partners.

To be sure, the road hasn't been easy, nor are Japan's businesses in general particularly wired. Strict regulations initially hindered the growth of the Internet, and persistently high leased-line tariffs controlled by a recalcitrant Nippon Telegraph and Telephone Corp. (NTT) continue to hamper network growth.

Perhaps the biggest example of the government's groping is an ambitious NII plan of its own, announced in May 1994 by the Ministry of Post and Telecommunications (MPT). It calls for a nationwide fiber-optic backbone to be built by 2010 at a cost of up to a whopping 55 trillion yen, or about $55 billion. The network, which is to be jump-started by low-interest government loans, would create a market worth 123 trillion yen ($1.23 trillion) by 2010. That far surpasses the size that Japan's automobile and electronics industries are each expected to reach in the same period.

HIROSHI NISHIYAMA

"1996 is the year of the Internet in Japan," *says Shumpei Kumon, executive director of the Center for Global Communications in Tokyo.*

In short, the grand plan has largely been dismissed as a pipe dream, and most business leaders have stopped waiting for their government to lead by example.

"We are a global company — 75% of our business is outside Japan — so we essentially don't care about the [national] information superhighway," Nobuyuki Idei said soon after the MPT plan was announced and before he became president of Sony Corp. in April 1995.

Idei's sentiments are echoed by droves of top executives. Pressed by the need to improve their white collar efficiency at home and in many cases link together their extensive operations around the globe, businesses have found a new lease on life through networking in the IT sense of the word.

Consumer electronics giant Matsushita Electric Industrial Co., the company behind the Panasonic, National, Quasar and Technics brand names, links — in addition to 500 Japanese business units — about 100 of its 183 overseas operations with a network it calls PanaVan.

Running at speeds between 128K bit/sec. and T1 (1.5M bit/sec.), the network carries internal voice, fax and data traffic. It has also streamlined the exchange of purchase-sales-inventory, shipping and general business planning information, according to Naotake Furukawa, leader in the planning department at the company's Osaka network center.

Having established hubs in Malaysia, Hong Kong, Taiwan and the Philippines, Matsushita is now expanding PanaVan into China. It expects by year's end to link 34 operations across the world's most populous nation.

In part, expansion of the network in Asia has been indirectly driven by the high yen. As exchange rate pressure has forced Matsushita to shift manufacturing to lower-cost sites outside of Japan, the network has followed as a means to manage the growing number of offshore sites.

The biggest benefit to date has been a cut in communications costs — the China expansion will reduce Matsushita's China communications costs by a reported 20%. The network is also a test bed for new technologies and services that Matsushita may one day make money on, according to Furukawa.

As for the Internet, most of the activity has been focused on building World Wide Web sites, but more advanced use of the Internet is beginning to take hold, observers say.

"1996 is the year of the Internet in Japan," Glocom's Kumon says confidently.

Osaka-based Kansai Electric Power Co. is constructing a TCP/IP-based intranet that by 1998 will link roughly 10,000 employees using Lotus Development Corp.'s Notes at the company's 111 offices in Japan's Kansai region, an official says. Reportedly costing roughly 5 billion yen ($46.7 million), the network will be one of the first large-scale intranets to hit Japan.

TO BE SURE, advanced internetworking is still the exception in Japan. In part, high access charges — Internet access fees in Tokyo are roughly 10 times what they are in Silicon Valley — have constricted growth. But those charges might soon be history if NTT becomes an Internet provider and, using a fiber-optic backbone, lowers access fees to roughly equal what they are in the U.S.

But though prices will fall, a more entrenched obstacle remains: managers' resistance to change.

Complains Mikio Arai, webmaster at Fujitsu Ltd., "Over 50% of my time is sacrificed battling managers who don't understand the importance of the network or the future role the network will play in their lives." ●

GUTH *is Tokyo correspondent for the IDG News Service.*

Commentary

BY Shuji Honjo

Catching on?

TO GET A SENSE of just where Japan stands when it comes to networking, consider these statistics:

- Last year only 14% of Japanese workers had PCs. In the U.S., 47% of workers did.
- Only 35% of Japan's PCs are networked, compared with 82% in the U.S.
- Japan has 160,000 host computers for the Internet. The U.S.? Four million.

There are many reasons for the lag, involving economic, cultural and technological factors.

From an economic standpoint, Japanese users often argue that high telecommunications costs limit networking activities. Nippon Telegraph and Telephone Corp., the country's dominant telecom provider, is a monopoly and keeps prices high.

Culturally, long-standing practices of keeping tight reins on the flow of information within companies has discouraged network proliferation. Capable people often try to keep important information to themselves. In a country with a penchant for hierarchy and consensus management, internal networks are often viewed as a threat.

And between companies, networking is hampered by the love affair with custom software. The result is that simple data exchange from one business to another is often quite difficult. The bottom line: Industry standards for data communications have been slow to evolve.

Technical problems inhibit networking, too. Typically, Japanese companies are committed to proprietary platforms from the likes of IBM, Fujitsu, Hitachi, NEC and others. Few have a consistent strategy to deploy open systems. It's not uncommon for several incompatible platforms to be deployed, making the situation worse.

But there are exceptions. A few innovative companies are embracing network-centric IT strategies and succeeding. Take Kao Corp., a supplier of cosmetics, soap, disposable diapers and other consumer products. It has shifted from multiple platforms and data formats to a compatible platform and integrated data formats, and from central computing to distributed computing with shared databases. It is experimenting with a "virtual factory," whereby two factories are controlled as one through a high-speed digital network.

It's not too bold to say that networking will drive Japanese corporate renewal in the 21st century. Early innovators are the bellwethers. ●

HONJO *is manager of business planning at CSK Corp., a professional services firm in Tokyo. He has extensive experience in business consulting and venture investment around the Pacific Rim.*

Photo: Tom Wagner/SABA/Photoillustration: Eric Pearl

FDDI SOLUTIONS FAST ETHERNET SOLUTIONS BUILDING/CAMPUS SOLUTIONS HOME OFFICE SO

SWITCHING SOLUTIONS REMOTE ACCESS SOLUTIONS STACKABLE SOLUTIONS S

Cómo administr redes ATM

¿Puede implantarse la estrella más reciente de

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Otra diferencia con conmutación, SNA, LAN Emulatio ramientas tendrán más amplia de dis

Es verdad que modificarán. Scott

Will ATM live u to its promise

Analysts argue about the much talked-about ATM technolo

UPI

As of today, Asynchronous Transfer Mode (ATM) produ been little used. The hope among vendors was that comple users with everything they n

he vendors still coming s

Qui a peur de l'ATM ?

La migration des réseaux locaux commutés vers l'ATM.

Les responsables des services informatiques peuvent appliquer les connaissances qu'ils ont acquises pour les réseaux commutés à l'ATM.

Les analystes recommandent à leurs clients d'étudier le cas de certaines sociétés, par ex lorsqu'ils envisagent d'adopter cette migration exigera sou matérielle assez coûteuse.

Les clients de Domeplex commutation de circuits, les r binaison des deux méthodes

En règle géné guère l'évolution technologic de Domeplex coïncide avec le éventuelle migration. Pour rep

ATM

An der Sc

Die technis

The ATM Debate

As Ethernet networks fill up, the network's next salvation – ATM – is still being developed.

user desktops at her glue distillery.

Now, just a few years later, Karen is once again faced the threat of a saturated network. So just this past spring, began looking at the networking's latest answer to bandwi Asynchchronous Transfer Mode (ATM).

But instead of answers, all Karen found was rhetori was surprised to find very few vendors offering the technol And I was even harder pressed to find anybody using it."

The talk and debate surrounding ATM has grown e nentially over the past few years. ATM's flexibility, high tr mission speeds and support for many media types have LAN managers and top executive chomping at the bit excitement.

Bandwidth-hungry applications ranging from e neering designs to videoconferencing are just a few appl tions that are ready-made for the new technology. But it w

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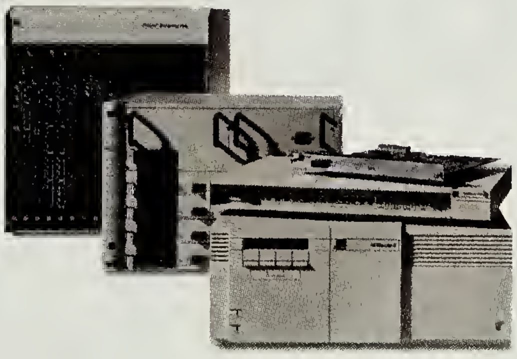

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SUSAN LEVAN

a better connection?

Telecom reform around the world promises better, cheaper, faster service for corporate customers. But when will the payoffs materialize? BY **Paul Korzeniowski**

LAST YEAR, Zurich-based ABB Asea Brown Boveri Ltd. wanted to install a global frame-relay network to support its operations in Asia, Europe and the U.S. that used Lotus Development Corp.'s Notes groupware.

Carriers were willing to give the company a networking deal for five, seven or even 10 years, but ABB demanded a two-year contract. "We do not want to get locked in to a long-term deal which would seem overpriced and obsolete in a few years," says Lars Sandel, a telecommunications manager for the corporate information systems staff in Zurich. ABB got what it wanted.

Telecom analysts agree that Sandel was wise to hold out. The rapid pace of telecom reform around the world will wreak havoc with service and pricing schemes during the next few years, they say. After years of posturing and often fruitless negotiations, many countries have begun moving earnestly toward telecom deregulation.

Significant work still lies ahead, but the pace is quickening and will alter the way that large international corporations build their networks.

The most obvious change: a smorgasbord of choices. In many countries, the national telephone monopoly is the only game in town; it carries every network connection. With deregulation, those nations will have at least two, and perhaps as many as a dozen, alternate suppliers.

Increased competition will bring lower rates, especially for businesses. New carriers, which don't have the infrastructure to reach all residents, typically target commercial customers. For example, London-based Mercury Communications Ltd. went after the business customer when the U.K. deregulated its services in 1984. To fend off the attack, giant British Telecommunications PLC (BT) cut its business rates while maintaining prices for residential service, says Eric Owen, an industry analyst at the London office of International Data Corp. (IDC), a market research firm.

Today, Great Britain is one of only a handful of regions with a competitive telecom market; Finland, Sweden and the U.S. are others. During the next three to five years, however, the number of deregulated markets could increase to more than 50, changing the global landscape.

SINGLE SOURCE

Besides offering lower rates, carriers are building end-to-end global services geared to large corporations such as ABB. Currently, firms have to station network managers around the world to deal with local carriers and monitor network performance. Many would prefer to hand that task over to telephone companies.

Carriers have begun teaming up and building single-source international services. One of those services is WorldPartners, which includes AT&T Corp., Kokusai Denshin Denwa Co. in Japan and Singapore Telecom. Another is Phoenix, a joint venture among Deutsche Telekom, France Telecom and Sprint Corp. Still another is Concert, a collaboration between BT and MCI Communications Corp. to sell global services. In June, Concert unveiled an international Internet access service. "Every large company is struggling with ways to get its users on the Internet, so this service is well-timed," IDC's Owen says.

Continued on page **16**

free enterprise

BY Jeanette Borzo

FOR GREGORY DMITRIEV, telecommunications deregulation has meant more than just the right to provide services previously monopolized by the state government. It's meant the right to self-determination.

"Deregulation — I don't think it's the right word," says Dmitriev, president and CEO of IncomA in Moscow. "Privatization" is a better term, he says. It is privatization that enabled Dmitriev to set up his company and create FastNet, the first frame-relay network in Russia, in 1993.

"In the States, deregulation means that the local exchange provider can provide long-distance services. What happened in Russia is more like [private companies getting] the right to install private telecommunications services," Dmitriev explains.

PETER BLAKELY/SABA

IncomA's Gregory Dmitriev *set up Russia's first frame-relay network in 1993. 'There was no way to do something like this before [privatization],' he says.*

Dmitriev started his business in 1990 — just two years after perestroika and the push to privatization began — by setting up electronic-mail services for the Central Bank of Russia. "After a year of operations, we got a problem with connectivity, and we needed a network to provide good service," Dmitriev says. "We put in a couple of nodes, got several customers and realized we must extend the network. Now we have seven nodes."

IncomA expects to add another two or three nodes in Moscow soon and 10 around the country later. IncomA, which currently has some 300 clients, is adding about five customers per month.

Rather than working with the Moscow city telephone network — the formerly state-owned agency that is now partially privatized — Dmitriev has found it less risky and more cost-efficient to use a variety of private providers, including the Moscow subway and the Ministry of Railways, for network cable and nodes. ●

BORZO *is an IDG News Service correspondent in Paris.*

Continued from page **15**

Because the partnerships are so new — formed only during the past two years — they are experiencing start-up pains. "The teams need to connect their networks, train their staffs and package their service offerings," notes Joanne Downey, director of European telecommunications research at Giga Information Group in London.

"Because these carriers are so large and the task is so complex, their progress has been slower than customers desire," Downey says.

Susan LeVan

✷ Decreasing quality of service could prompt a firm to switch carriers

Industry analysts agree the partnerships have potential. The teams should relieve network managers of the headaches of troubleshooting international lines. They have significant clout, too, which will help them negotiate with national carriers and offer lower rates.

But the joint ventures are no panacea: They are strong in a handful of countries but leave much of the globe uncovered. To address this problem, the teams are expected to add members during the next few years. Eventually, every major carrier may team up with one of those groups.

QUALITY IN QUESTION

Of course, there is a cost to reform. As competition intensifies, carriers will have to become more cost competitive, and that usually leads to downsizing.

Since deregulation occurred, BT has cut its staff in half, from 200,000 to 100,000. And in a dozen years, AT&T and its seven subsidiaries have cut 120,000 employees from the payroll; the company plans to sever 40,000 more workers during the next few years as part of its recent breakup.

Such constant cutting affects corporate network performance.

Just ask Harry Tompkins, manager of Internet services at Ciba-Geigy Corp., located in Tarrytown, N.Y.

"Carriers have eliminated many experienced middle-level managers," Tompkins says. "Consequently, network quality of service has been slipping. Problems are more frequent, and fixing them takes more time."

To date, the issue has been annoying rather than catastrophic. But decreasing quality of service could prompt a firm to switch carriers. Global companies such as ABB, with short contracts, will be in the best position to adapt. ●

KORZENIOWSKI *is a freelance writer in Malden, Mass. He can be reached at paulkorzen@aol.com.*

Commentary

BY Daniel D. Briere

Don't hold

CONVENTIONAL WISDOM has it that by late 1997 or early 1998, the launch of international communications competition will usher in a new age of global telecommunications. This belief has been fueled by telecom reform in the U.S. and across Europe and, on the international stage, through the World Trade Organization's (WTO) telecom talks.

The reality, however, is that the race among communications carriers has already begun. Most carriers vying for foreign business, such as AT&T with its WorldPartners, MCI with its Concert effort and Sprint's GlobalOne venture, are beginning to look like marathoners at the 20-mile mark — still running but getting awfully tired. Users, too, are reaching exhaustion. They are tired of unfulfilled promises of one-stop shopping, integrated billing and single customer support numbers.

Improvements are in the offing, but don't hold your breath. Until the myriad national and international rules are firmed up, there will be a lot of talk and a flurry of activity behind the scenes, but little substantial change. Users will still be dealing with multiple providers, networks and support centers, even if they have one pretty-sounding marketing name, like GlobalOne, WorldPartners or Concert.

Don't expect a sprint to the finish line from these companies, either. Some factors will sap the energy from even the fittest of the fit:

1. Setting the rules. Even though the industry is moving toward greater competition, continued ambiguity of the rules — such as what types of resale are allowed — will keep the pace of reform slow. The investment necessary for huge partnerships such as WorldPartners, Concert and GlobalOne is heavily influenced by the exact interpretation and implementation of regulations, and until regulations are finalized, caution will be the watchword.

2. The pace of technological change. While most such change is rapid, changes to "customer-facing" systems always take time and money. These billing, customer sup-

your breath

port, network management and sales support systems take years and millions of dollars to implement. Typically, the investments are made reluctantly, without clear rules as to how services can be provided and charged for, and therefore billed.

3. Uneven application. As recent spats between the U.S. and other carriers in the WTO telecom talks show, telecommunications reform on a global basis is a politically charged issue. Each country will have its own interpretation of what "fairness" will entail, and rules will vary from country to country. These inconsistencies will contribute to the slow adoption of true global solutions. And it's not just Third World and Asian countries that are attempting to protect their home markets, either; Western countries such as Portugal and Austria are also dragging their feet on adopting "open skies" telecom policy.

For large multinational companies with many overseas operations, changes in regulatory rules will allow major carriers to implement custom systems, such as virtual private networks based on a single network architecture and supported by resale of private lines. Smaller firms should not expect an immediate flood of improvements. However, they will be able to find some good deals on international connectivity from smaller global providers, such as Telegroup, Inc. in Fairfield, Iowa, and Viatel, Inc. in New York.

As corporate managers look at this uncertain international marketplace, they should keep in mind that this market is changing rapidly. Much domestic telecom technology has become mature, but that isn't true of the international market. Understanding the offers available, keeping abreast of new services and providers, and keeping options open during negotiations as the market develops will allow corporations to take advantage of the best that competition has to offer. ●

BRIERE *is president of Telechoice, Inc., a Verona, N.J.-based telecommunications consultancy. He can be reached at dbriere@telechoice.com.*

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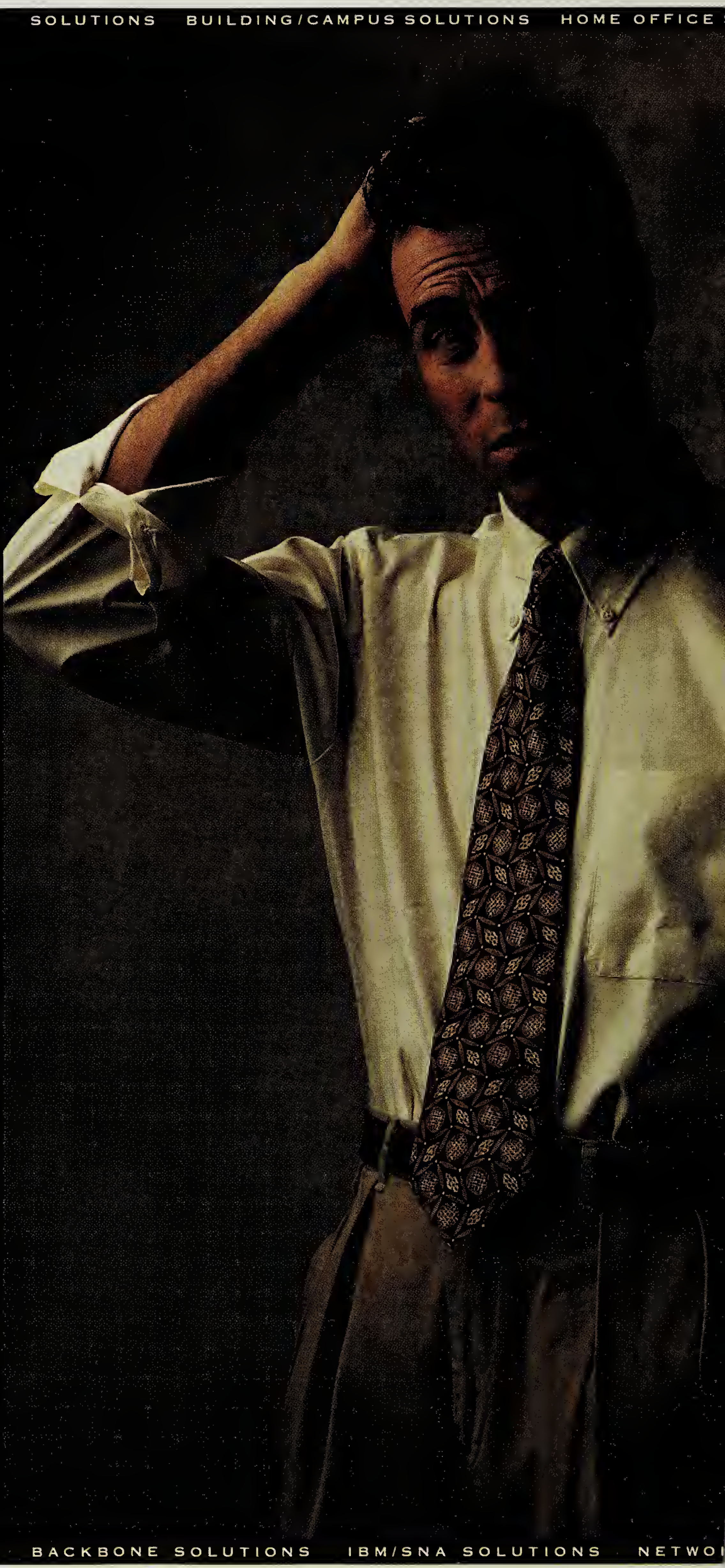

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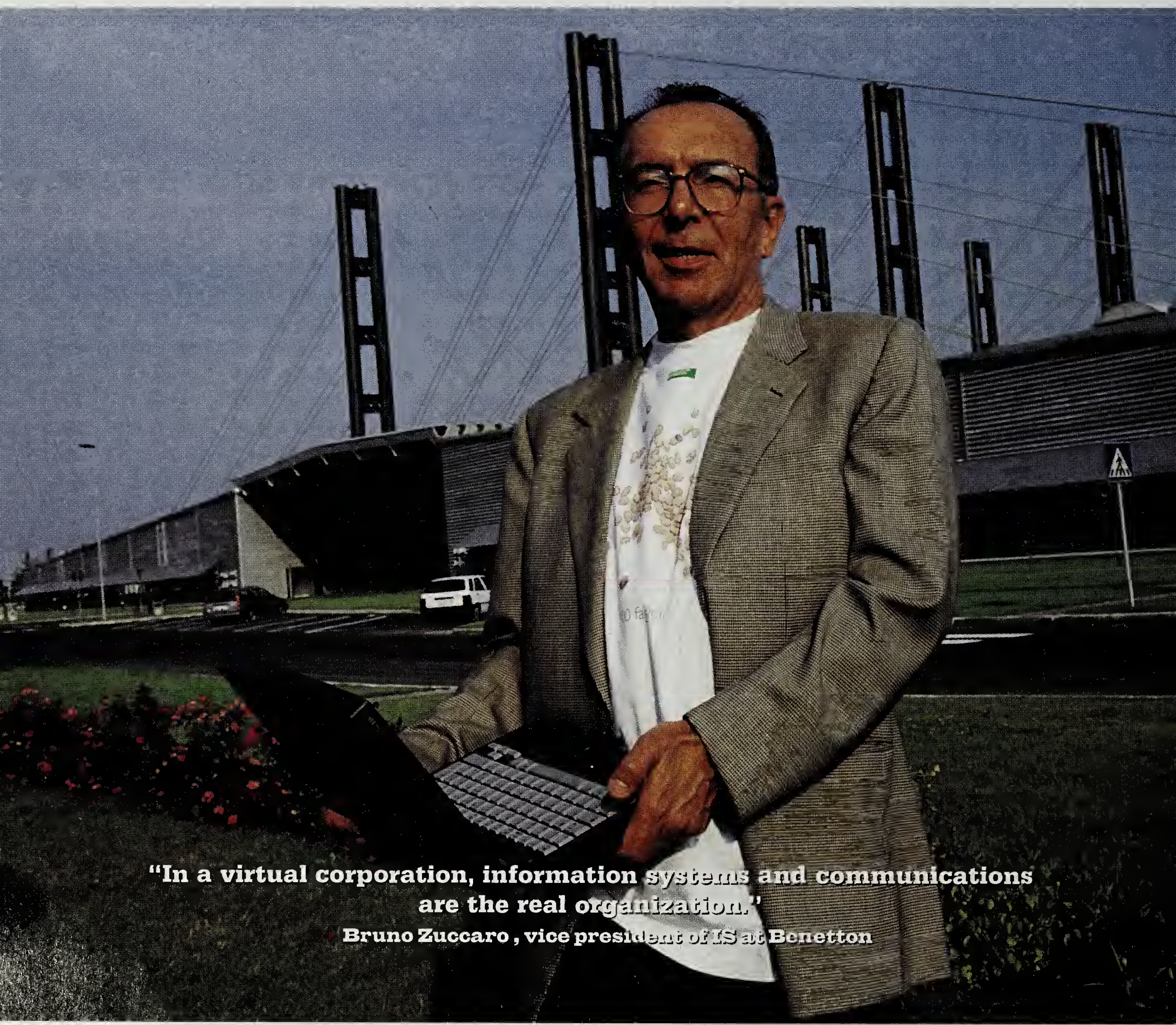
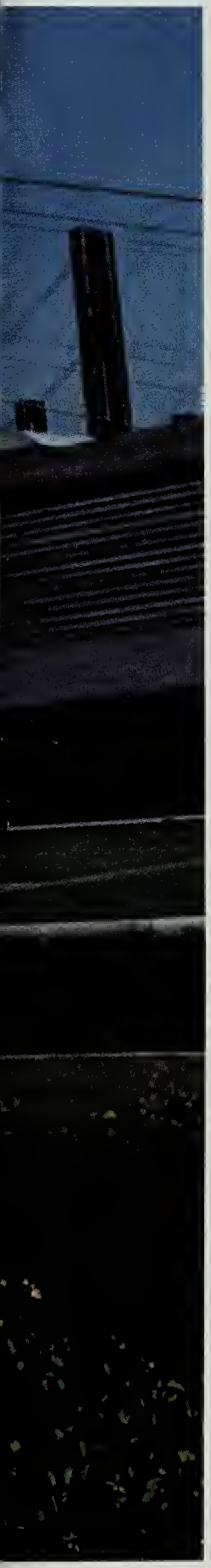


"In a virtual corporation, information systems and communications are the real organization."

Bruno Zuccaro, vice president of IS at Benetton

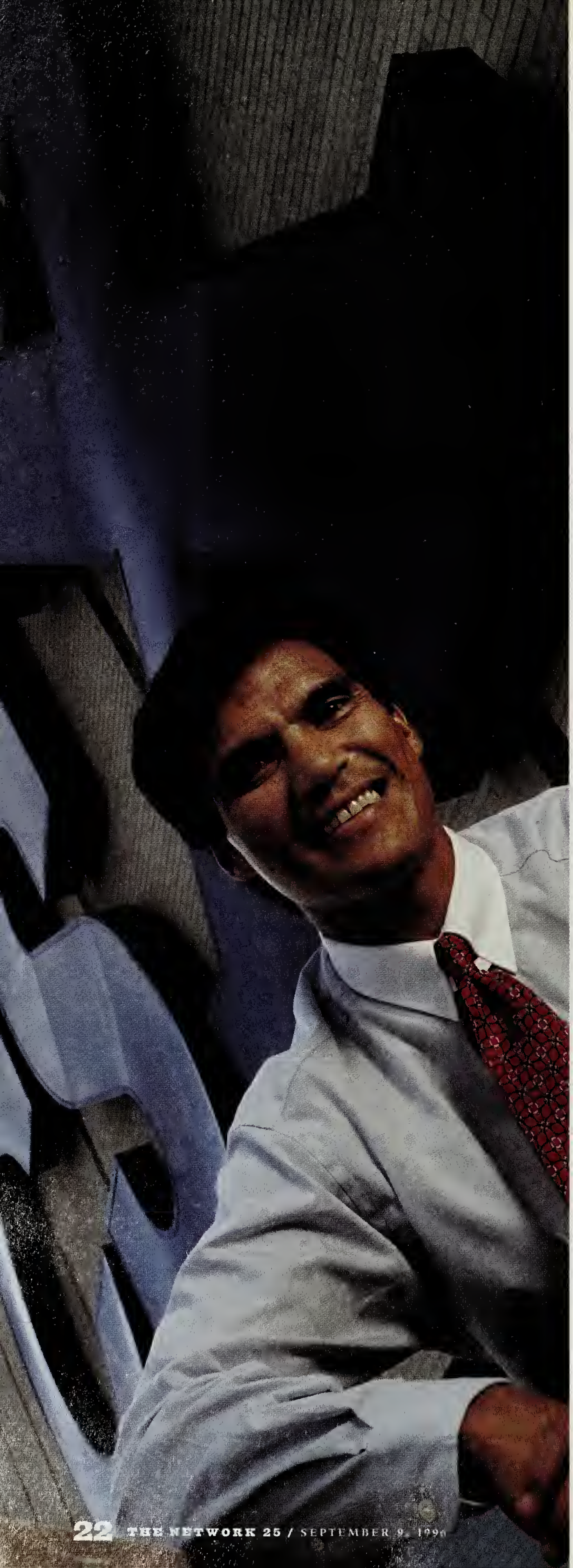


Enrico Bossan/SABA

right here, **right now**

By Elisabeth Horwitt and Ron Condon

ZERO DISTANCE BETWEEN USERS. That was the call to arms at Black & Veatch Corp., the $1.1 billion global engineer and constructor, as it built a global network during the past decade. Making sense of the labyrinth of leased lines and VSAT connecting 6,000 PCs and 6,100 professionals in 80 offices worldwide was a challenge. The



Alex McKnight

slogan helped focus the information systems staff on the task at hand; it also makes a good rallying cry for any IS department struggling to globalize its network.

There's no question that removing the distance barrier is the next frontier for many international organizations. A design engineer 7,000 miles away needs the same information as the marketing executive at company headquarters. In the same interface. At the same time. Now.

Of course, not all companies approach the task of connecting far-flung operations the same way. Cultural differences among companies and regions of the world ensure that. But surveying a handful of global networking innovators in the U.S. and Europe reveals some common themes — and some differences — in the quest for zero distance between users.

WHY GET CONNECTED?

Higher productivity. Kansas City, Mo., home of Black & Veatch (B&V), is a long way from the island of Pagbilao in the South Philippines. Which, in turn, is a long way from civilization — and not just the 100 miles to Manila. Engineers who traveled by small boat to the island to build a power plant found people who lived in grass huts, says Greg Moore, network manager. Facilities were limited, at best: "They only had diesel-generated electricity. The only water was desalinated. And the only communications were cellular," he recalls.

It took a combination of a satellite-based VSAT network from Pagbilao to Manila and terrestrial connections from there to Kansas City to provide an adequate communications infrastructure for the island site, Moore says.

Such links are well worth the trouble. For one thing, they give B&V project teams access to PowrTrak. The decade-old, constantly evolving system gives engineers in remote locations access to computer-aided engineering, project control and engineering design applications and a huge repository of data and designs. By drawing on the experience of their peers and past projects — using past designs as building blocks for current, similar projects, for example — B&V engineers can significantly lower turnaround time and costs.

Take the recent construction of a power plant in Michigan. Using PowrTrak reduced the number of change orders from an average of 3,500 to just two — yes, two, Moore says. At $10,000 per change order, that's an estimated $35 million saved because the plant was designed right the first time.

B&V is broadening PowrTrak to include electronic data interchange connections so it can communicate with business, in addition to design, partners. The links will "connect us not

CSX's John Andrews *says moving to one global carrier would centralize negotiations across borders* only with development partners and construction people but banks, suppliers and insurance companies — anyone who is involved in power plant construction," Moore says.

Central control. For Benetton Group SPA, the Italian clothing and accessories company, the remote location that had to be networked was headquarters itself. Housed in a 17th-century castle in the town of Ponzano, Italy, Benetton's headquarters bridges the ancient and the modern. The clothier is run as a virtual company, in which sales agents and manufacturing operations are dispersed around the world, says Bruno Zuccaro, vice president of information systems.

By using multilingual client/server applications over outsourced value-added networks that connect 30 countries, the 120 participating companies can exchange information on clients, orders and products. At headquarters, a Token Ring network over a fiber-optic backbone carries office traffic, such as clothing designs that the staff digitize and send to manufacturing plants over an Ethernet connection. "In a virtual corporation, information systems and communications are the real organization," Zuccaro says. "Communication enables us to manage all the world from this little village near Venice. We don't have to be in New York or Tokyo."

Knowledge dissemination. In the pharmaceutical industry, any improvement in communications with doctors, testing laboratories, suppliers and distributors can translate into savings and competitive advantage, says William Hoffman, project manager of electronic messaging at SmithKline Beecham PLC. Recently, however, the U.K.-based company has found a new role for its global network: collecting and disseminating information to the pharmaceutical and health care organizations that are its customers.

As a drug manufacturer, SmithKline collects huge volumes of information based on shipments and customer feedback, Hoffman reports. The company's global messaging network provides a vehicle for collecting that information efficiently and accurately. SmithKline then compiles that data, analyzes it and identifies key trends and statistics, such as the increasing demand for a particular drug or an unusually high incidence of a particular side effect. The network can then disseminate that information back to customers quickly and reliably, either as a value-added service or, increasingly, as a product that customers pay for.

Toward that end, a unified messaging infrastructure that will support a broad range of communications media and services has been in the works for several years. Now, through an open messaging infrastructure based on Simple Mail Transfer Protocol (SMTP) and X.400, the company is close to its goal. "The immediate pressure is for people to communicate with outside companies, everyone from advertising consultants to pharmaceutical suppliers," Hoffman says. The goal: a seamless, reliable, efficient flow of information that supports the end-to-end process of manufacturing, delivering and marketing pharmaceuticals. ➻

Steven Curtis

➻ **B&V's Greg Moore:** *'The biggest questions are of ownership of connections' between B&V and its overseas partners*

Customer connections. For CSX Transportation, Inc., the Internet is the newest vehicle of choice for improving customer contact. The Jacksonville, Fla.-based rail carrier is working to provide its customers with direct access to information about their shipments along its 18,000-plus miles of domestic track.

Seven of the company's largest customers are piloting an Internet-based version of CSX's Transportation Workstation, a front end that allows CSX employees "to graphically monitor shipments, trace them, find contents of shipments and look up price schedules," says John Andrews, president of CSX Technology, Inc. and senior vice president of technology at CSX Transportation; both are subsidiaries of CSX Corp. The service will enable corporate customers to check on the status of their shipments more quickly and cut costs by eliminating the CSX middleman. CSX is also testing a beta version of an Internet appliance, a barebones workstation with a World Wide Web browser, as a possible client for the service.

WEB WORRIES

While some companies are rushing to embrace the Internet, many firms still distrust it for business applications. Swissair runs a Web site with flight times, but "there is no use of the Internet for operational applications," such as those that communicate between booking systems, the airlines and the aircraft, says Edi Kaufmann, head of networking at Swissair. Those functions run on a private network. The Internet "is not reliable enough, the performance is not stable and, for operational purposes, it is not possible," he says.

That concern is echoed by Ken Garrod, managing director at Barclays Technology Services, the information technology company for international banking firm Barclays PLC. "We need to see how the Internet is going to evolve," Garrod says. "The security issues need to be resolved. It's possible that the Internet could split into two: a truly commercial superhighway and a global worldwide advertising network."

Intranets — internal networks that use Internet technologies — seem to have more universal appeal than a movement into electronic commerce, at least right now. CSX is in the process of implementing a standardized internal communications infrastructure based on Web browsers, Web servers, Usenet news servers, SMTP electronic mail and TCP/IP, Andrews says. Its purpose is to "increase an employee's ability to locate the correct piece of information or appropriate person independent of where they reside across the globe," he says. That is, zero distance between users. ●

HORWITT *is a freelance writer and consultant in Newton, Mass.*

CONDON *is London correspondent for the IDG News Service. He can be contacted at ronzo@cix.compulink.co.uk.*

Commentary

BY Leonard Kleinrock

Assembling

WE ARE BECOMING a world of plugged-in corporate nomads. More than 25% of PC sales this year will be laptops. Nomads travel anywhere and expect to be able to connect to the full complement of information technology resources that they have back home on their desktop.

At the same time, the world is becoming connected — the nomads are becoming a tribe. Through the Internet and the World Wide Web, we are enabling that tribe to connect their powerful portable platforms through a rich global network in which information is virtually free and immediacy is the standard.

But while "nomadicity" is an emerging paradigm, many enabling technologies are holding us back from realizing the full benefits. Indeed, the technologies can be more burdensome than liberating. At the same time, we all suffer from "feature shock." Most of us can't operate our VCRs, let alone understand all the functions of the latest spreadsheet, personal digital assistant (PDA) or the overwhelming options of surfing the Web.

I'm a prime example. When I travel — which is often — I typically carry a notebook computer, a cellular phone, a PDA and a pager. I often feel like Pancho Villa loaded down with all this paraphernalia, heading off to do battle with the U.S. Cavalry.

The challenge to the system designers and vendors today is to simplify the nomad's life. They must start to provide a transparent and integrated set of computing and communications capabilities and services for the nomad. I'd like the system to allow me continuous interaction with my applications and not force me to concern myself with details regarding my location; the particular communications device I am using — PCMCIA modem, cellular and so forth; the bandwidth I happen to encounter, be it 100 M bit/sec. or 0 bit/sec.; the computing platform I happen to be using; and whether or not I'm in motion.

the tribe

For example, I don't want to be bothered as the system adjusts itself to the best available communication medium; just give me the impression of continuous connectivity. If I initiate an operation such as a file update or the transmission of an E-mail message and the system chooses to defer that operation for its own reasons (lousy connectivity at the moment), I shouldn't be pestered with that fact.

But we are a far cry from that state. Instead of an integrated support system for the nomad, we're seeing rollouts of unrelated niche products. Most of the notebooks, PDAs, palmtops, pagers, cellular phones, Cellular Digital Packet Data systems, personal communication systems and personal information management systems on the market fail when it comes to interoperability.

Nomadicity is an emerging fact of life, and it is clear that our physical and logical IT infrastructure must be extended to support this mobility in a variety of ways. The needs are real, and the payoffs in terms of productivity can be huge.

But confusion reigns. And it will continue to reign until we face up to the integration challenge. The computing and communications industries must think in terms of developing products that are enabled for nomadicity. To accomplish that, we need an architectural model for nomadicity. Once that architecture is defined, we must develop the protocols that provide transparent, virtual connectivity for the nomad. The industry will have to agree on a set of standards to support those protocols, and product offerings should conform to those standards.

The time is ripe to create an industry forum that begins to consider those issues. If we fail to account for nomads at this early stage, we will seriously inhibit our ability to meet their needs of the nomad. ●

KLEINROCK, *a founding father of the Internet, is a professor of computer science at UCLA, president of Nomadix LLC and chairman of the TechnologyTransfer Institute. He can be reached at lk@CS.UCLA.EDU.*

PHOTO: LARA JO REGAN/SABA/PHOTOILLUSTRATION: ERIC PEARL

CONTROL Central

★ Technology comes but cautiously to China, where the government holds the purse strings. But fledgling networks are leading the march into the future.

By Anna Foley

CHINA IS A LAND of stark contrasts. From barren Mongolian steppes to booming centers of trade, China's population of 1.2 billion is at once progressive and traditional. The country's networking infrastructure mirrors this diversity.

On the one hand are thriving commercial centers such as Shanghai, Guangzhou and Shenzhen. All three have trial Asynchronous Transfer Mode (ATM) networks in place and plan new, innovative services. Elsewhere, however, end users must make do with public X.25 packet-switched networks for wide-area communications, or leased digital circuits that, in most cases, run at less than 2M bit/sec. They have little hope of moving to higher-speed technologies in the near future.

Developing countries are usually characterized by rudimentary communications infrastructures. But for that very reason, they are also often touted as ideal candidates for leapfrogging more advanced neighbors in adopting leading-edge technology. China is no exception.

"China is like a blank piece of paper, and Chinese people like to take the best of whatever they can. So many organizations are constructing their buildings with state-of-the-art networking in mind," says Nanying Yin, Bay Networks, Inc.'s ATM Forum representative in China.

THE COMMUNIST WAY

But China's economy isn't market-driven. Government planning and funding drive development of the network infrastructure and companies' adoption of advanced technology.

That presents problems for some firms. The government's view is that the development of the network infrastructure must be centrally controlled; with the country's limited resources, market-led development can't be allowed, notes one Western diplomat in China. In addition, he says, there's a general lack of understanding of technologies such as ATM. "It's one thing to say Chinese companies are leapfrogging the rest of the world. If they don't know how to use what they've got, then they're not leapfrogging," he says.

China has only recently installed its three national datacom networks — Chinapac, Chinaddn and Chinanet. All can be upgraded to run ATM traffic, but Chinese officials are likely to want to recoup their initial investment before committing additional funds, says Lynn Crisanti, an analyst at International Data Corp. in Beijing.

Officials from the Center for Information Infrastructure and Economic Development at the Chinese Academy of Sciences estimate that the government will need to spend $50 billion over the next five years to upgrade China's public voice network alone.

In some areas of China, however, isolated municipal authorities and telecom providers are embracing broadband ATM as a potential money spinner. Pockets of state-of-the-art network use are springing up in prosperous regions around Shanghai and in Guangdong Province, which borders Hong Kong. Those installations are providing models for other cities to follow. ➳

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Shanghai. "The Ministry of Posts and Telecommunications encourages local PTTs [postal, telephone and telegraph agencies] to develop new services in line with their standards, although they don't give us any money for them," says Zhang Wei Hua, vice president of the Shanghai Posts and Telecom Administration (PTA).

Zhang says the Shanghai PTA has been testing ATM-based videoconferencing services between the municipal governments of Pudong and Puxi since the end of 1995. It has also installed high-speed LAN-to-LAN connections to Jiaotong University. The services run on IBM switching equipment.

The next step will be to extend ATM service to high-income residential areas, laying a combination of fiber to the curb to buildings and hotels, Hua says. Applications will include videoconferencing and entertainment services such as karaoke-on-demand and video-on-demand. But the PTA expects to face some broadcast regulatory issues before the commercial launch can go ahead, Zhang says.

★ **A municipal project in Shanghai will provide access to databases and online services by 2010. A firewall will shield citizens from the Internet.**

The PTA's ATM backbone will also form the basis for future communications in Shanghai Infoport, an ambitious municipal information infrastructure project. Due for completion by 2010, Infoport is to provide access to nine private online multimedia databases that offer services such as finance, insurance, statistics and trade and to Shanghai On-Line, a public information network that offers access to a variety of domestic and international information systems, Zhang says.

In line with China's overriding goal of sheltering citizens from so-called harmful Internet content, however, Infoport plans to use a firewall between Shanghai On-Line and the Internet.

Greg Kiger/SABA

Huamei's Gary Savage *plans to offer on-screen tourist information and near-video-on-demand to hotel guests and residents*

Guangdong province. John Ure, director of the Telecommunications Research Project at the University of Hong Kong's Center of Asian Studies, says that, as a region, Guangdong Province in the south of China is moving ahead of Shanghai. That's because advanced networking initiatives are starting to take off provincewide.

For example, based on desktop ATM equipment from First Virtual Corp., Guangzhou Huamei Communications has been piloting ATM-based videoconferencing links across the provincial capital of Guangzhou since 1995. By contrast, in Shenzhen, the city government plans to pilot videoconferencing among 33 government bureaus by next July.

Huamei — a joint venture between U.S. partnership SCM/Brooks Telecom and a subsidiary of China's Commission of Science, Technology and Industry for National Defense — was established in 1993. It uses AT&T and General Datacom ATM equipment to provide broadband services around the city over the Guangdong PTA's fiber backbone.

The target market for Huamei's full-service network is hotels and associated office and residential blocks, says Gary Savage, Huamei's acting chief operating officer and a Brooks executive vice president. For economic and regulatory reasons, urban commercial complexes have tended to grow up around hotel sites.

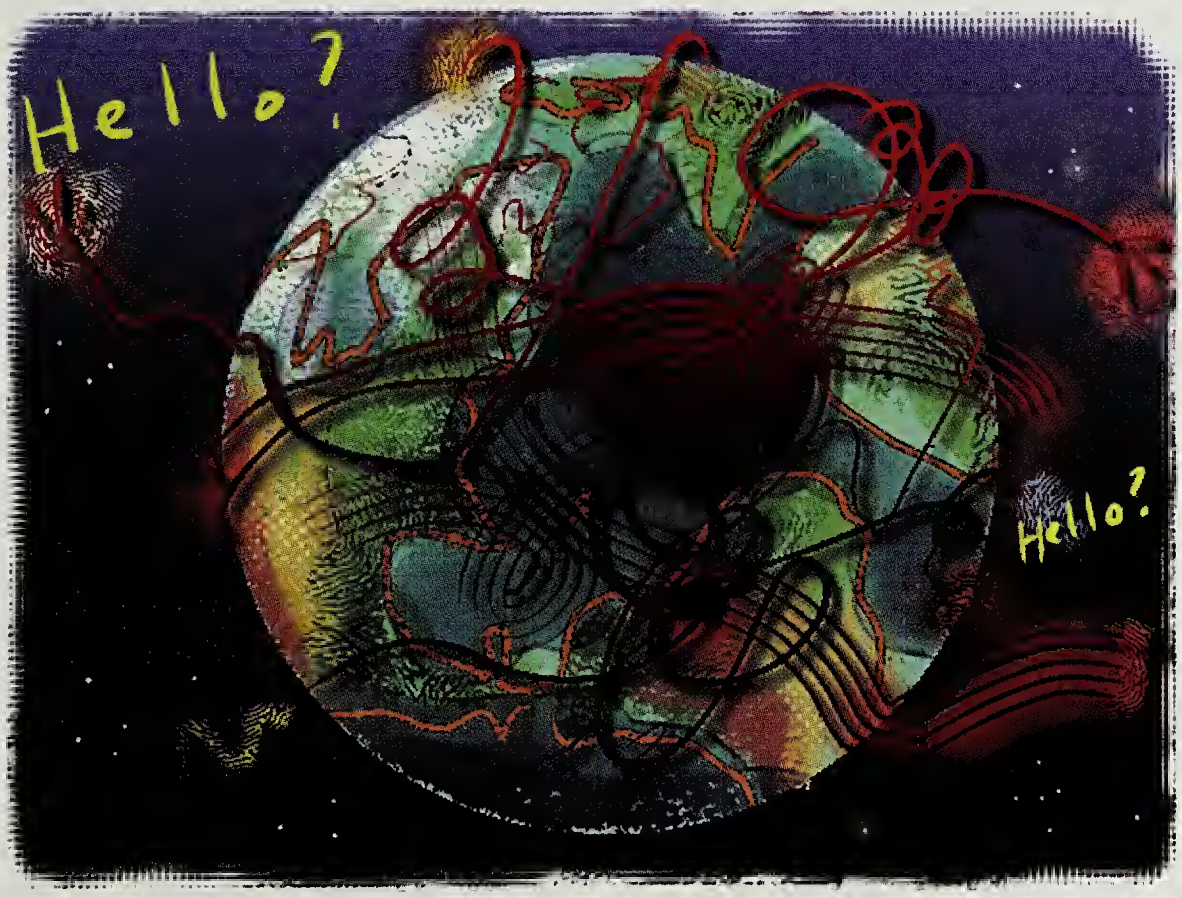
Savage's plan is to offer on-screen tourist information and near-video-on-demand to hotel guests and residents. It also plans videoconferencing in business centers with links to Beijing and, ultimately, international locations. "We're aiming to be in two or three hotels, serving roughly 1,300 rooms, by the end of 1997 and in 100 hotels and 40,000 rooms by 2002," he says.

Despite detailed business plans and the experience of a U.S. partner, such ventures run the risk of investing in a state-of-the-art network and then finding few subscribers to generate income.

The challenges are both political and economic. But for the most part, China analysts agree, now that the doors to technology innovation have been opened, they can't be closed again. ●

FOLEY *is associate editor at* Computerworld Hong Kong.

'net around the world



Hello?
Hello?

SUSAN LEVAN

No borders, no boundaries. From Finland to Brazil, companies are leveraging the Internet and the World Wide Web to boost their bottom line.

Geffen Records: An intranet keeps this studio putting on the hits. Page 32.

Times of India: It's intranet time at India's largest daily newspaper. Page 32.

ABB: Engineers can't buy turbines on the 'net, but they can connect. Page 34.

Bradesco: The 'net forges worldwide frontiers for a Brazilian bank. Page 34.

Schwab: Bull market today? Do some trading online. Page 36.

Merita: How a Finnish bank enables direct payment over the Web. Page 36.

Seeking all the hits

Rock 'n' roll

and . . . information technology. It's a combination that wouldn't have meant anything to Buddy Holly or Janis Joplin. But at Geffen Records, IT is a central part of the rock 'n' roll mix, both on the face the company presents to the public via a World Wide Web site and internally, with an intranet.

That intranet, used for notes, plans, reports and dozens of what would usually be paper-based documents, is extraordinarily effective, executives say. "Finding stuff on paper is really hard, but on the intranet it's a lot easier," says Doug Fenske, assistant to Jim Griffin, vice president of the technology department. "You know where the information is without having to go through lots of people."

The intranet supports Geffen's corporate culture, too. Besides the usual electronic-mail services and corporate news, the intranet boasts a large number of local restaurant menus. Late-night munchies and lunches out are apparently part of the scene in the record biz.

Geffen wasn't always so cutting-edge, however.

When Griffin joined the company at the start of 1993, it not only didn't have an Internet connection, it didn't even have a LAN. Then, online services such as CompuServe let the "cat out of the bag — [staff] were finding useful information online, and they began to demand access to the outside world," he says. His first mission, Griffin decided, was to develop a technology department that would provide more than just network services.

Naturally, one of the first things the group did was set up a Web server. Its site (http://www.geffen.com), which Griffin says was the first established by a recording company, promotes Geffen's repertory of artists and lets visitors sample new releases, find out about their favorite bands and even send fan mail. It's also used to recruit artists, who tour the technology department when they visit the company.

On the internal side, Geffen's technology group had first looked at client/server to see if that architecture made

The Times, they are a-changin'

India's largest newspaper blazes new trails with one of the first intranets in the country

HERE'S A REASON to set up an intranet: collaborative thinking.

That's one thing A. K. Peter says drove *The Times of India* to take the intranet route. The New Delhi-based *Times*, the country's leading English-language news daily, launched its intranet application just last month. It is probably India's first such major intranet application.

"If somebody wants to say something, he or she can put it down on the home page. If anybody wants to react to it, they can do so," says Peter, general manager of information services at *The Times*, the flagship of heavyweight publishing group Bennett, Coleman & Co. Ltd. "It will ultimately boil down to a very efficient information system."

The Times' home page on the World Wide Web (http://www.cyberindia.net/timesofindia/home.htm) features news and general information about the newspaper and its sister publications. The intranet includes internal information in areas such as marketing and finance; it is restricted to employees.

One major use of the intranet will be conducting quarterly business reviews of the 30-plus offices nationwide. "The Web-based intranet will enable sense. It concluded that it didn't. "With client/server you gather information, process [it] and distribute [it] — it takes too long," says Griffin. "We put the tools in their hands: Better we should teach them to fish than fish for them."

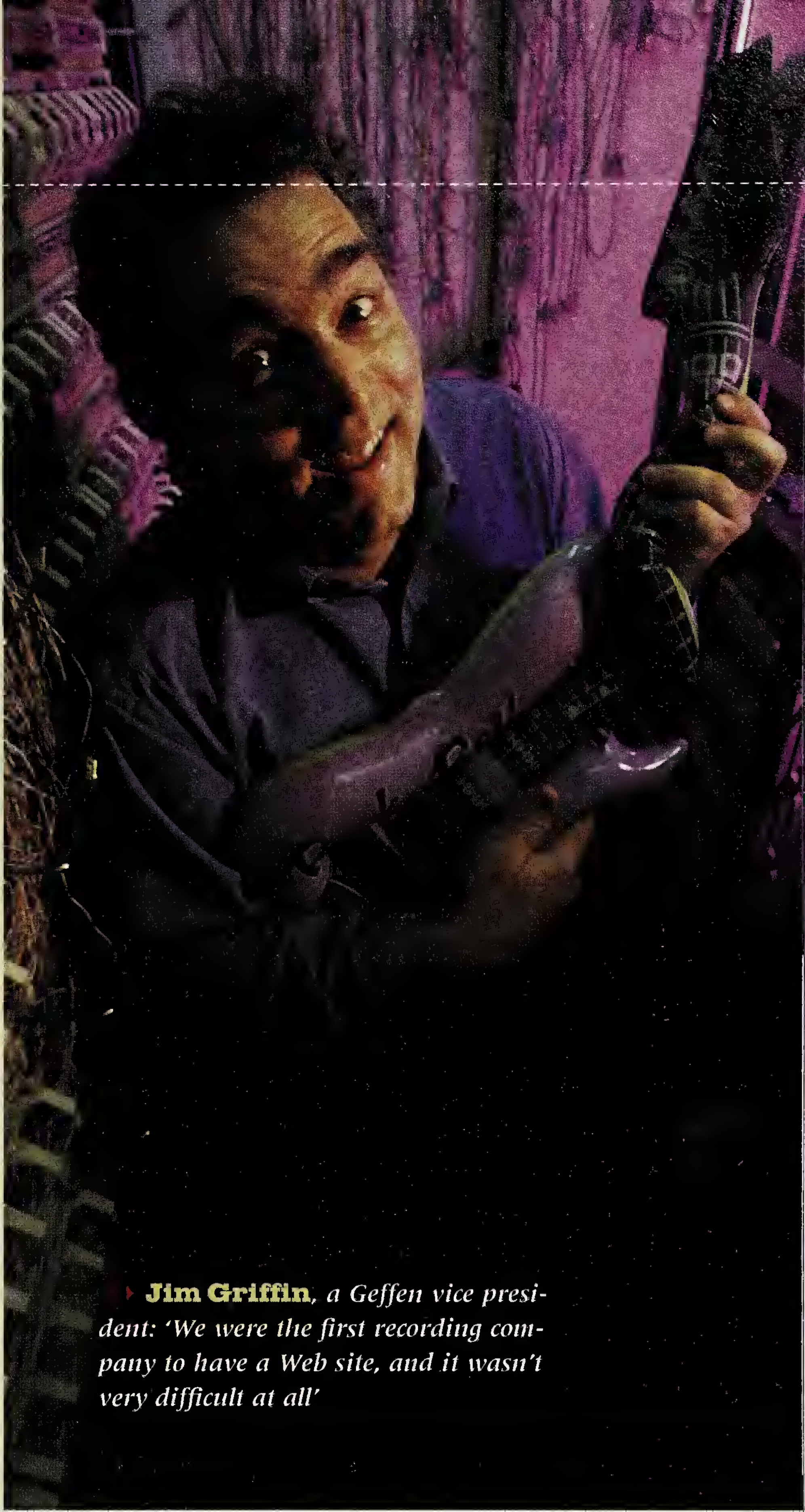
That's what led Griffin the way of an intranet, a setup that brings the Internet down to the desktop and allows any user in any department to create and manage the information themselves. (Firewalls based on custom systems control access between the Internet and the intranet.) The intranet is based on a central network at Geffen's headquarters in Los Angeles, the location of the company's main Internet gateway. From there, the intranet has links to London, New York, Chicago and Atlanta as well as 30 field offices that support about 225 users.

The intranet's ease of use is an important aspect, Fenske says. "When I came to this company, all I knew about was Windows 3.1. But learning to use our intranet was easy, and I can find out anything about our business that I need to know," he says.

"I think that one of the ways to find out if you are doing a good job with your intranet is to ask people in your organization who is responsible for the Web server. If they answer, 'the technical department,' you're probably not doing a good job," says Griffin. "People should say, 'me' — they have to take ownership."

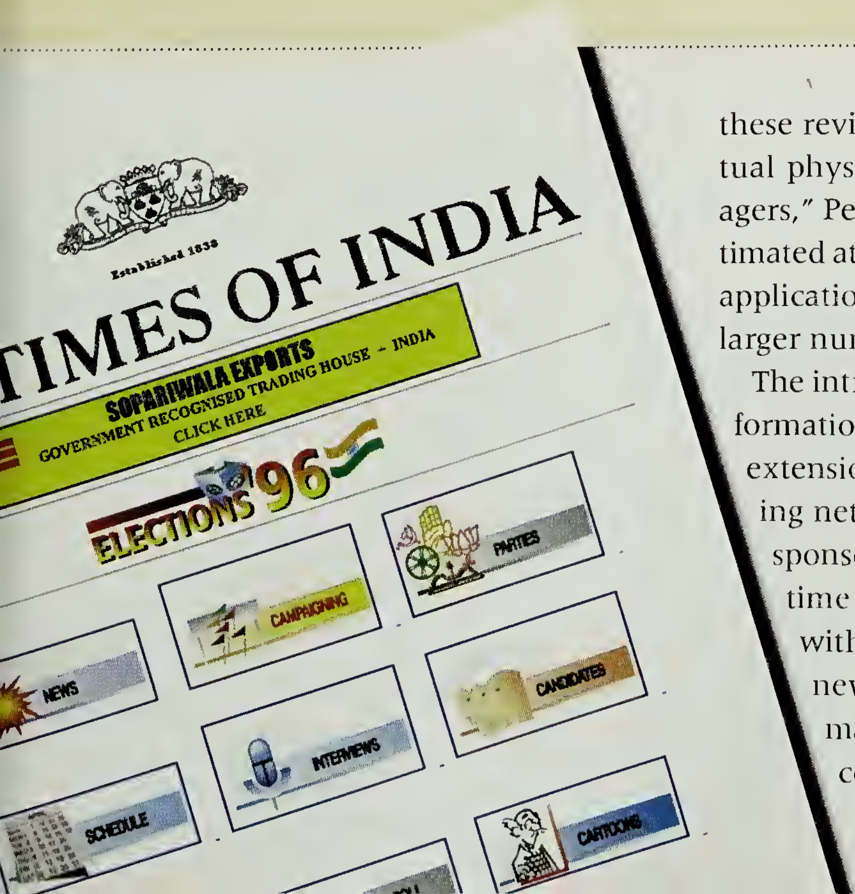
For the future, Griffin says, "the objective isn't just faster and cheaper; it's focusing on doing things with the Internet and intranet that haven't been done before." Kind of like the challenge to musicians everywhere. ●

BY MARK GIBBS, *a writer and consultant in Ventura, Calif. He can be reached at mgibbs@gibbs.com or (805) 644-4999.*



Jim Griffin, *a Geffen vice president: 'We were the first recording company to have a Web site, and it wasn't very difficult at all'*

Lara Jo Reagan/SABA



these reviews to take place without actual physical interaction among managers," Peter says. Initial savings are estimated at $20,000 but will rise once the application is implemented across a larger number of centers.

The intranet, the brainchild of the information services division, is a logical extension of the organization's existing network, RespNet (short for Response Network). RespNet is a real-time online information service with two large networks: one for news dissemination and information sharing and one for the company's revenue/commercial departments. One of the most important applications running on the company's 4-year-old WAN, RespNet enables advertisers and advertising agencies, for example, to obtain instantaneous scheduling updates and billing and accounting information for the many regional editions of the paper.

Company sources say the intranet is the future at *The Times* and will form the basis of all internal and global communications for the organization. "It will power the enterprise," Peter says. ●

BY VINITA CHAWLA, *editor of* Computerworld India.

Hitting the right Notes

ABB

Asea Brown Boveri Ltd., the biggest electrical-engineering company in the world, aims to leverage its global infrastructure to make optimum use of the Internet.

The other key part of its strategy: using the Internet capabilities of Lotus Development Corp.'s Notes 4.0. With 50,000 users (and eventually as many as 90,000), ABB's Lotus Notes setup is one of the most sophisticated anywhere.

Installation began about three years ago; the system now encompasses 750 dedicated Notes servers linked to five main worldwide network hubs. It has 300 dedicated administrators.

"Notes is a controlled and administered environment," says Bengt Skantze, group senior vice president and manager of group information systems. "And now, when I open Notes, I can click and get access to the Internet and stay within my controlled environment." That controlled environment lets ABB streamline overhead and standardize on basic communications software, even though the company is very decentralized.

Going to the Internet to exchange electronic mail and retrieve information is quite different, of course, from doing business on the World Wide Web, Skantze notes. Right now, ABB sees the Web as an information publishing medium, a way to communicate with the outside world and to steer potential suppliers and clients to the appropriate part of ABB's global empire.

Zurich-based, $30 billion ABB, born out of a merger of competing industry titans Asea AB and BBC Brown Boveri Ltd. in 1987, serves the electrical power generation, transmission and distribution markets, as well as industrial and rail transportation customers.

Its home page (http://www.abb.com) offers press releases, general information about the company and its products, and hyperlinks to individual company sites. Visitors can drill down to the level where local phone and fax numbers and sometimes E-mail links are available. But that's as far as the company is willing to go for now. "For us it's a bit more long

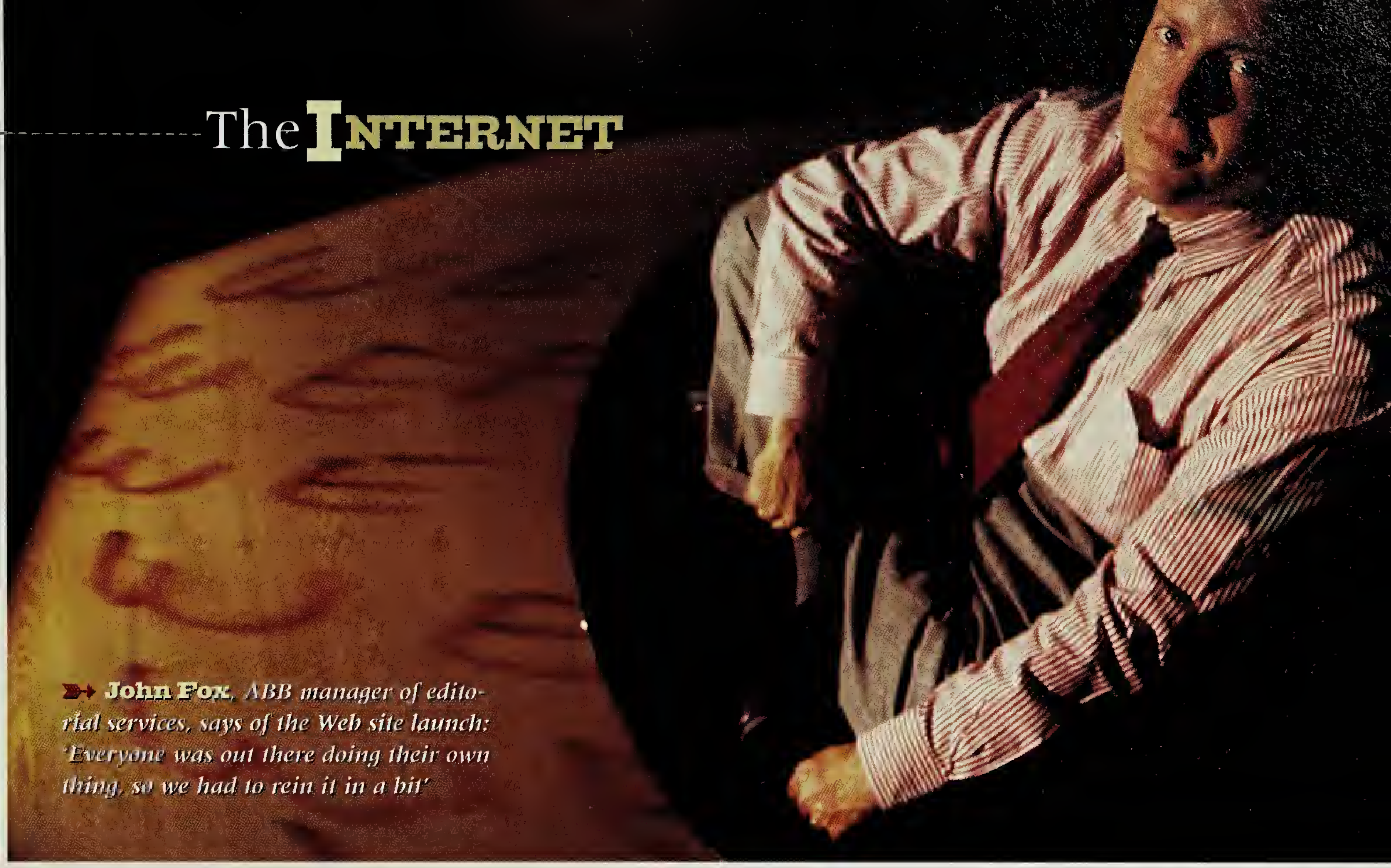
Banco Bradesco banks on the 'net

An 800-page Web site and home banking service put Brazilian institution in global eye

BANCO BRADESCO likes to be first. The largest private bank in Brazil, with assets of more than $20 billion, it was the first bank in the country to install computers in 1962. And in May 1995, it was the first Brazilian bank to go live on the World Wide Web.

The pioneering spirit to automate goes hand in hand with Bradesco's ambitious plans to be a global banking player and a domestic powerhouse. Consider that the bank has more than 20 million accounts, conducts 216 million transactions per month, adds 6,000 new accounts per day and spends about $200 million per year on information technology. "We wish to give our customers the quickest possible service," states Bradesco's CEO, Lazaro de Mello Brandao, in a recent company report.

Bradesco's site on the World Wide Web (http://www.bradesco.com.br) is part of Brandao's plan. Its more than 800 pages offer information on the bank's principal products and services, provide access to company reports and financial statements and offer access to a home banking network. The site received more than 100,000 hits in May



John Fox, *ABB manager of editorial services, says of the Web site launch: 'Everyone was out there doing their own thing, so we had to rein it in a bit'*

BENOIT DECOUT/SABA

term. We are not an insurance company — you don't buy a turbine on the Internet," Skantze notes.

But even simply publishing information on the group home page and maintaining the hyperlinks to local-company Web sites can be a complex task for a group of some 1,000 companies operating in 140 countries around the world.

"In the beginning, it was chaotic. Everyone was out there doing their own thing, so we had to rein it in a bit," recalls John Fox, manager of editorial services at ABB headquarters.

In keeping with the decentralized nature of the company, ABB has left it up to the local companies to decide whether, and to what extent, they want to transact business on the Web, Skantze says. Those choosing to participate must follow some basic guidelines to convey the sense of a global brand. The guidelines cover such elements as logo appearance and placement, and the ratio of logo size to hot-button size.

ABB companies are also studying possible uses of intranets, but Skantze says he's dubious that a worldwide intranet will be built. Proponents say an intranet would be less complex than Notes, but Skantze says Notes is sufficient as an intracompany communications system — and one environment is preferable to two. ●

BY MARC FERRANTI, *Paris bureau chief for the IDG News Service.*

— 84% percent from Latin America, but 3.3% from North America, 2% from Europe and the remainder from Australia and the Far East, says Odécio Grejo, the bank's technical director.

Bradesco spent about $200,000 during the initial phase of the Web project and recently injected another $400,000 to expand the Internet-based home banking service, according to Bradesco Executive Director Aluizio Borges.

The home banking service, called Bradesco Net, offers interactive banking 8 a.m. to 8 p.m. weekdays. Customers can transfer money between accounts, request home delivery of checks, schedule and pay bills, check balances, obtain account statements, manage investments and use their Bradesco/Visa credit cards. All commands in the environment are cryptographically protected.

RICARDO AZOURY/SABA

Aluizio Borges *says Bradesco spent about $200,000 in the initial phase of the Web project*

Bradesco's next Web project: an intranet. It would be an alternative to the current electronic-mail system, which has 23,000 users and handles 24 million transactions per month. ●

BY ERIVELTO TADEU, *executive editor of* Connections, *an IDG affiliate in Sao Paolo, Brazil.*

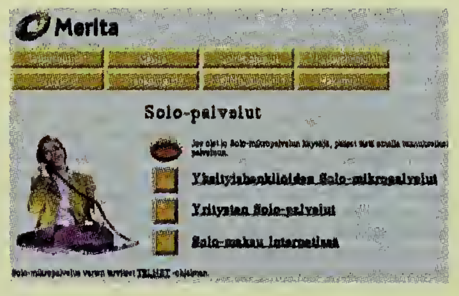
FINLAND LEADS THE WORLD in per-capita access points to the Internet. Yes, Finland. In fact, with only 24 people per 'net host, the nation blows away nearest competitors Sweden and Australia, which are tied with 59 people per access point, according to Killen & Associates in Palo Alto, Calif.

So maybe it's no surprise that Merita, the biggest bank in Finland, is one of the first banks in the world to offer electronic fund transfers directly from client to customer over the Internet. And Merita Bank Ltd. is also creating an intranet and planning to put other banking services on the 'net.

The Finns are a receptive lot for such experiments. "In all forms of networking, Finland is a kind of laboratory, and so Internet payment is the tip of the iceberg," says Kalevi Kontinen, the head of Merita data systems in Helsinki. Why? "The Finns are rather solitary and independent, and if anybody gives them a choice to do something themselves, they like to do it," he explains. "The Finns are also real techno-freaks, and they are quick to jump on the latest gadgets."

Merita's Internet payment service is connected to an electronic-cash system called E-cash. Provided by Netherlands-based service provider EUnet NV, it was developed by Digicash, Inc. in New York. Participating vendors display a button marked Solo on their payment screen.

Merita



To use the service, Web shoppers simply fill out the vendor's usual payment form and click on the Solo button. That brings up the Solo payment screen, on which users type in their account numbers and a one-time, four-digit code. When the user presses the "OK" button, Merita debits their bank account and credits the vendor account with the payment for the order. Right now, users must be customers of the bank, and due to international banking laws, both parties involved in the transactions must be in Finland. So far, 11 Internet vendors offer the Solo payment option, and 100 more have requested it.

Merita is further leveraging its Internet know-how to develop a user-friendly enterprisewide information system. Tests of the intranet will start in the third quarter, and users will be trained by the end of the year, Kontinen says. ●

BY MARC FERRANTI, *Paris bureau chief for the IDG News Service.*

Time is money,

and nobody knows that more than financial services companies. So when the Internet took off months before Charles Schwab's Web site was scheduled to debut, the company accelerated its program. Time to new site: three months, from concept to operation.

Schwab

Schwab Online (http://www.schwab.com) executes stock trades and confirms them with the client within 60 seconds. It also tracks portfolios in either delayed or real-time mode, depending on the type of account. Clients must use a secure browser, such as Netscape Navigator or Microsoft Internet Explorer, so transactions can be kept private.

"Schwab has always believed that information technology is the best route to providing better service at lower cost — and the Internet is an ideal service medium," says Gideon Sasson, senior vice president of electronic brokerage technology at Schwab.

Schwab Online, the first service of its kind among the big brokerages such as Fidelity and Grubb & Ellis, debuted in March. It's not Schwab's first electronic effort, though. Schwab introduced a dial-up trading service, StreetSmart, in 1995; all its customers can use it, whether they have regular accounts or electronic E-Schwab accounts. (Regular accounts allow the use of branch offices and telephone-based services; E-Schwab accounts use online services only. The E-Schwab service carries a 10% discount on trading activities.) StreetSmart uses proprietary software; the Web-based brokerage uses back-end applications that Schwab can upgrade on the fly and enhance as needed.

Though it won't disclose numbers, the brokerage says Schwab Online is already profitable enough that the company is moving into the next round of development. The next iteration will add improved graphics and other features that Schwab officials are hesitant to discuss.

"You'll see Schwab focus more and more on the Internet as a way of providing increased value to our investors," Sasson says. "I don't think it's an issue anymore whether there will be an online economy — it's just a question of details and how fast it will happen. Financial services are going to lead in giving users a real reason to use the Internet." ●

BY MARK GIBBS, *a writer and consultant in Ventura, Calif. He can be reached at mgibbs@gibbs.com or (805) 644-4999.*

Commentary

BY Jan Hertzberg

Latin flavor

AS IN MANY PARTS OF THE WORLD, the popularity of the Internet in Latin America has grown dramatically. Large banks, government agencies and newspapers have been leading the way in offering services on the Web, and now many small entrepreneurs are starting to sell products over the 'net. Electronic malls, some operated in the U.S., provide a forum for businessmen to sell everything from tapes and CD-ROMs to specialty foods. One even has a directory of Brazilian restaurants.

But the greatest value of the Internet to Latin American businesses is not as a commercial medium. It is in providing a global communications infrastructure that will enable them to distribute and extend IT services, such as E-mail and distributed applications, to remote offices, distributors and business partners. Unlike U.S. carriers, Latin telcos have traditionally offered unreliable and expensive data and voice communications services. If used as part of an overall IT strategy, the Internet will eventually help level the playing field by providing global, reliable services at a fraction of the cost of private data networks.

But while the Internet holds great promise, there are some significant inhibitors:

- In many Latin countries, universal access is far from universal and robust telco infrastructure remains spotty.
- To date, Internet usage costs in Latin America have remained high, especially compared with those in the U.S., due in large part to expensive local dialing rates.
- Latin American businesses often lack the back-end links that allow them to easily exchange transactions with one another. In the U.S. and elsewhere, transaction networks are the workhorses that facilitate the exchange of purchase orders, invoices and other documents.
- Significant language and cultural obstacles must be overcome to make Latin American Web sites attractive to non-Latin users. At a minimum, home pages must be available in English, the lingua franca of the Internet.

In time, many of these obstacles will be addressed. With the privatization of national communications infrastructures and the entrance of large, global Internet service providers in the region, competition will force improvements in service and reduce prices. Transactions will be made easier through common Internet procotols, improved systems integration and Web application development tools. Those tools will also enable Web developers to create applications in different languages, enhancing their appeal. ●

HERTZBERG *is a manager for the Center for Technology Enablement at Ernst & Young in Chicago. He can be reached at Jan.Hertzberg@ey.com.*

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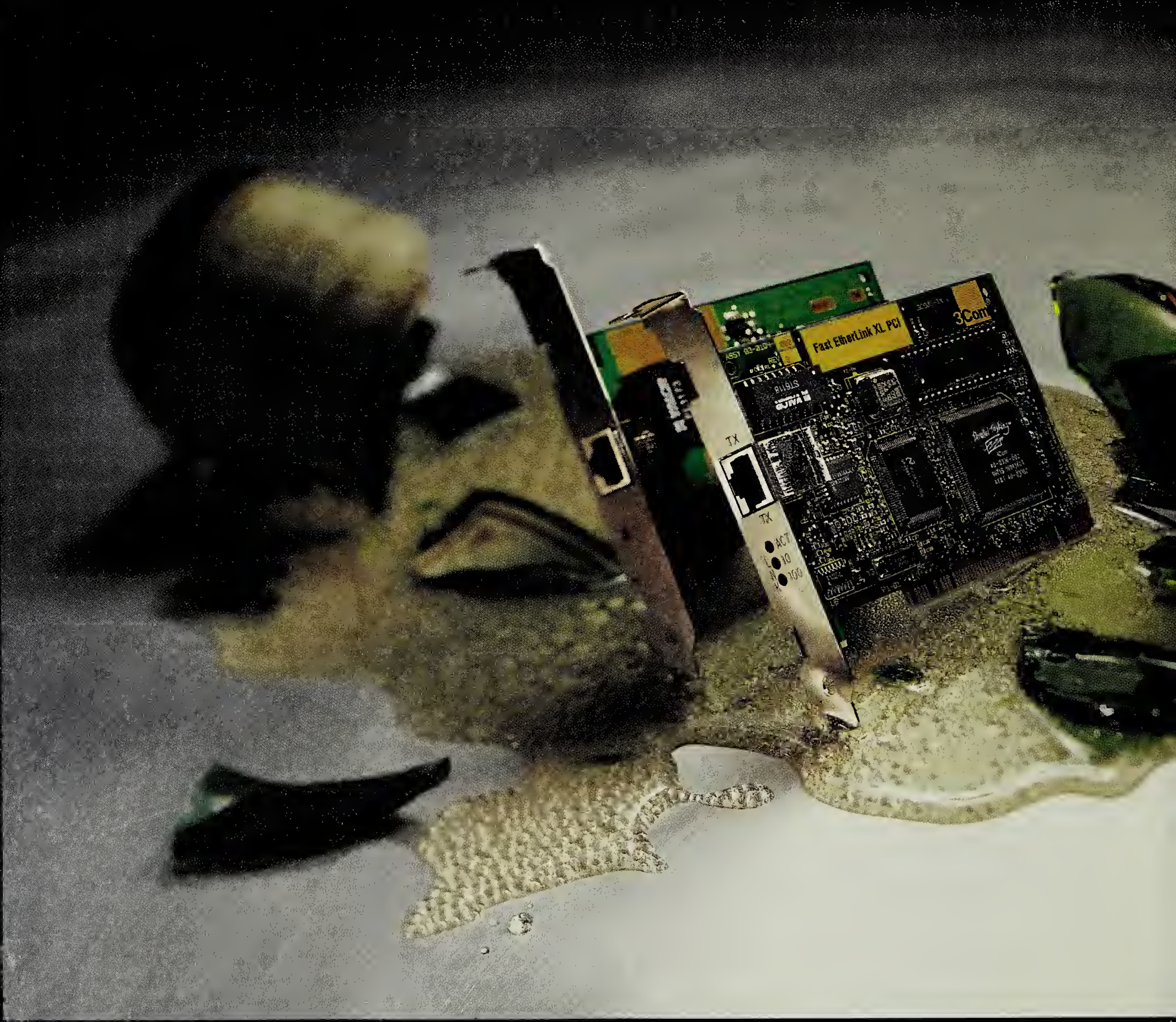

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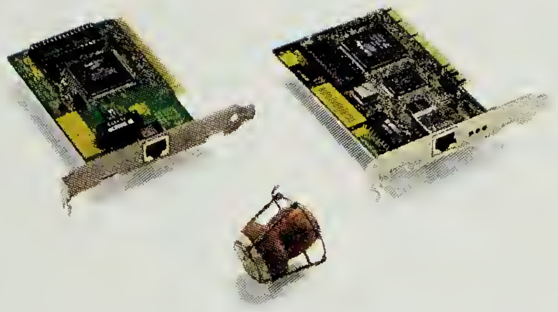

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extreme

From the South China Sea to Egypt's Sahara Desert, an oil company must have seamless communication around the globe. It's the price of doing business.

ON AN OIL PLATFORM 300 miles off Mexico in seas thousands of feet deep, Amoco Corp. networking technicians quietly installed the future. It was late 1994, and the future took the form of floating, high-end servers and networking gear that could talk to a NASA test satellite.

The mission: To beam multimedia seismic data collected from beneath the ocean floor directly to supercomputers in the U.S. at T1 (1.54M bit/sec.) speeds in a special demon-

network

BY
Joanie Wexler

stration for the federal government and the public. In production mode, this system would save Amoco millions of dollars by speeding up data collection decisions and ultimately allowing the $30 billion firm to re-engineer the way it dispatches ships for more accurate drilling.

The event marked the birth of an industry-pioneering project to unite users, equipment makers and network service providers in perfecting the much-hyped, but little-deployed, Asynchronous Transfer Mode (ATM) technology. ATM is a high-speed packet-switching technology that packs bits into fixed-length cells.

Conceived to run at 45M bit/sec. and faster, ATM is often viewed as nirvana for mixing voice, data and video onto one network. One primary appeal of ATM applications like Amoco's: Equipment scales easily and inexpensively to higher speeds as traffic expands, says Carl Williams, Amoco's chief information officer.

Since the the Gulf of Mexico demonstration, the Amoco project, dubbed the ATM Research and Industrial Enterprise Study, or ARIES, has produced two other demos and grown to include the entire petroleum industry, which hopes to collectively save tens of millions of dollars one day by using ATM technology.

In the second demo, in the fall of 1995, also from the fixed platform in the Gulf, the speed of the transmission link jumped hundredfold, to 155M bit/sec. And this past February, the group demonstrated the shipment of seismologic data gathered off a moving vessel in the Gulf of Mexico to the Minnesota Supercomputing Center in Minneapolis. Because the vessel was moving, the speed of running the ATM protocol over NASA satellite links dropped to 2M bit/sec. The first demonstration used a General DataComm Corp. Apex ATM switch with a T1 interface, but subsequent trials used Fore Systems, Inc. ASX 200 switches with higher-speed interfaces, says David Beering, a senior staff telecommunications analyst at Amoco.

AMOCO HASN'T LIMITED its trailblazing networking efforts to ARIES. With operations that stretch from the frigid North Sea to the Egyptian desert, Amoco has also been instrumental in helping bring new services to out-of-the-way places.

PAUL ELLEDGE

Amoco has embarked on a two-year plan to move to an ATM switched network. "We hope to reduce complexity by collapsing many networks into one." — CARL WILLIAMS

The company has used its clout in other countries and their phone companies, for example, to test new network services. One result: commercial Integrated Services Digital Network in Malaysia.

In oil-rich Egypt, Norway, Trinidad and Tobago, where Amoco has large operations, the company "purchased earth stations with more capacity than we needed" and is reselling services to others, says Alex Gonzalez, manager of Amoco's international communications. Gonzalez manages satellite networks that serve 16 countries and run at speeds up of to T1.

Private satellite and terrestrial nets have often been more cost-effective in many parts of the world where monopoly phone companies reign. Gonzalez estimates the company saves at least 50% by running private lines and compressing traffic.

Where public services are economical, Gonzalez has deemed frame relay the Amoco standard. He uses services from Concert — a joint venture between MCI Communications Corp. and British Telecommunications PLC — in Hong Kong, the location of the company's Far East chemical headquarters. He uses Scitor Corp., an international carrier, in Europe.

"No matter how remote workers are, you have to provide telecommunications services," Gonzalez says. In the South China Sea, for instance, floating platforms, tankers and facilities on the mainland communicate via microwave and satellite. The tankers run LANs and private branch exchanges (PBX) for communications.

Amoco has an unusual setup in the North Sea whereby it uses a scheme called tropospheric scatter to communicate wirelessly from Scotland to an oil platform. Tropospheric scatter is a point-to-point technology that works like microwave but isn't limited to line-of-sight transmission, Gonzalez explains. It can deliver communications as far as 500 miles by using Earth's troposphere as a big mirror to reflect signals between two points.

"This has the capability of connecting with various platforms and could provide a means of serving more than just Amoco" at some point, he says. U.K. carrier BT manages the network for Amoco, Gonzalez says.

ARIES is still the most dramatic example of Amoco's initiative to break ground with networking technologies that should eventually deliver significant payoffs for Amoco and others.

Under the tutelage of telecom analyst Beering, ARIES participants are weathering the bumps and bruises of equipment interoperability and applications testing with ATM suppliers, which include seven carriers and three switch-makers. Getting those growing pains out of the way will go a long way toward greater acceptance of the complex multimedia network.

ATM will slash seismologic decision making from weeks to hours, Beering says. Every month eliminated from a survey — and one can take months — saves about $200,000, Beering says. The industry runs several hundred surveys each year.

The goal is to transmit data — up to a terabyte per week — collected from underwater test equipment directly from exploration vessels to supercomputers. The data travels via high-speed ATM over satellite links from ship to shore, then over fiber for the terrestrial leg of the trip. "I see the [ARIES] network growing into a utility that eventually becomes an energy industry Internet," Beering says.

In addition to the ship-to-shore data transfer, ARIES is honing ATM gear into what will become a high-speed terrestrial backbone for the oil community, which Beering expects to be in place in about a year.

The modus operandi in the energy industry has traditionally been to store data on magnetic tapes that fill cratefuls by the time the ship docks. Then explorers send the piles of tapes via courier to a supercomputing center for processing. But the time-consuming task of converting data from tape to disk must happen first. It can take weeks or months from the time the data is collected for it to show up on the computer; all the while, oil vessels could be drilling in barren areas.

Transporting data to the supercomputers directly from a ship-based satellite dish should enable geophysicists to see where oil lurks and decide almost simultaneously where to send ships and how long to drill, the ARIES tests have shown.

In May, Amoco completed its internal ATM pilot and began a two-year plan to move the company off its time-division multiplexer (TDM) network in the U.S. and onto an ATM switched network. That will be the start of Amoco's "shift from a private wide-area network to networks based on public services," CIO Williams says.

The network goal, he says, is to "move bandwidth management headaches off our backbone into the carrier's" in an era when the World Wide Web, intranet access, Lotus Notes database replication, desktop videoconferencing and other applications stress bandwidth. "We hope to reduce complexity by collapsing many networks into one that is scalable [to higher speeds] simply by making a phone call to the carrier."

STARTING this summer, Amoco's Cisco Systems, Inc. router network will detach from the Network Equipment Technologies, Inc. IDNX T1 TDM backbone; LAN traffic will feed from the routers into ATM switches, Beering says. Later this year, the company plans to unplug its PBXs from the IDNX and send voice on its way over the public-switched telephone network.

And last but not least, the IBM 3275 and 3745 front-end processors will eventually drop off, no longer single-handedly cost-justifying an entire TDM network themselves; SNA will hop on the ATM net as well. At that point, Amoco sites in Chicago, Atlanta, Houston and Tulsa, Okla., will plug into an ATM "cloud," or public ATM network service.

"Carrier-based ATM has great potential for replacing TDM," says Tom Pecelunas, supervisor of network services at Amoco's Chicago headquarters. "The cost per bit over ATM is cheaper, and we now have significant expertise built up in-house with ATM" because of ARIES.

Pecelunas says a frame-relay/ATM hybrid net in the U.S. is on the horizon: Frame relay, which is optimized for data, will fit the bill for sites with low to medium traffic, and ATM will carry higher-speed applications for those that mix voice, video and data, he says.

Still, on a worldwide basis, getting uniformity across services is tough. Amoco Chemical Asia-Pacific in Kuantan, Malaysia, was a guinea pig for Telecom Malaysia frame-relay services, says Ken McDaniel, Amoco's information technology operations supervisor. "But we just couldn't get a reliable connection up," and the project has been put on the back burner, he says.

And in sub-Saharan Africa, virtually no data services exist, Gonzalez says, and satellite service is cost-prohibitive. The company runs only business offices there, and they communicate by the dial-up phone network. But knowing Amoco's commitment to technology and influence, many Africans might soon be conducting Notes-based collaborative data conferences. ●

WEXLER *is a senior editor at* NetworkWorld *in Sunnyvale, Calif. She can be reached at jwexler@nww.com.*

Brewing up ARIES

HOW DID AMOCO become an Asynchronous Transfer Mode (ATM) junkie? As David Beering, a senior staff telecommunications analyst at Amoco, tells it, the saga officially began at the Gordon Biersch Brewery in San Francisco, a casual hot spot where Silicon Valley product plans take shape, engineers find jobs and rumors of industry intrigue are launched.

That is where "networking" — of the personal variety — paid off for Amoco.

Beering was seeking a high-performance network to hasten turnaround in the oil exploration business. Amoco spends between $4.5 billion and $5 billion annually on exploration, and he says he was convinced networking could slash those costs.

"When you want to compress time and distance, one way to do that with far-flung sites is satellite," Beering says.

He had a friend at NASA, which operates the $750 million, 622M bit/sec.-capable Advanced Communications Technology Satellite, and another at Sandia National Laboratories, the Department of Energy's research facility in Livermore, Calif. Beering and his Sandia acquaintance Ray Cline, then director of distributed computing, met at Gordon Biersch, drew the satellite model on a cocktail napkin and took the project to NASA.

Two years later, they had the $1 billion ARIES test network up and running. — ***Joanie Wexler***

> **"I see the [ARIES] network growing into a utility that eventually becomes an energy-industry Internet." — DAVID BEERING**

PAUL ELLEDGE

Networking a nation

Electronic banking is taking off in South Africa. One target audience: the 'unbanked' rural population

BY **Simon Cashmore**

THE TERRAIN of the KwaZulu Natal is hilly, with frequent mist and lush vegetation. The region's remote, rural communities have few, if any, modern services: Paved roads, running water and telephone service are rare. Political violence between members of the African National Congress (ANC) and those of the Inkatha Freedom Party has racked the area in recent years, resulting in banditry and bloody feuds between communities.

Until recently, a pension-payout vehicle would arrive every two months to give residents of retirement age (60 for women, 65 for men) their government stipend of 300 rand (about $67). Pensioners would wait for hours for the vehicles to arrive; then they'd wait some more as IDs were checked and verified.

A program called Cash Paymaster Services (CPS) from First National Bank has brought a piece of the late 20th century to all that. The pension vehicles that arrive now are security trucks outfitted with modified automated teller machines (ATM). And the lines move quickly: The ATMs identify pensioners by their thumbprints, so all a person needs to do is place his thumb on a biometric reader. The system also cuts down on fraud. Since it was introduced, the number of people who receive payments has dropped by 20%.

First National Bank's *pension payout vehicles include biometric readers that identify recipients by their thumbprints. The vehicles serve 500,000 retirees in KwaZulu Natal.*

CPS was pioneered by the bank in conjunction with local information technology group Datakor. The bank's most adventurous remote banking project, it has attracted considerable interest among regional and local government organizations eager to provide basic financial services to rural and largely illiterate communities.

The South African banking industry is undergoing a profound transformation driven by powerful social, economic and technological forces. Until recently, apartheid, poverty and high bank fees had excluded most blacks from the industry. For example, an ANC spokesman estimated that, until the general election last year, only 5% of the total value of housing mortgage bonds granted by banks had been awarded to blacks. He also estimated that less than 25% of adult blacks in metropolitan areas had ATM cards and that only 1% held a credit card. South Africa's black adult population is about 20 million; blacks account for 75% of South Africa's total population.

To this enormous "underbanked" population banks are launching extensive initiatives — access to loans, development funding, savings and investment mechanisms, and provision of cash payment and transaction facilities.

"While South Africa reflects world banking trends, we are also faced with uniquely local challenges. The bulk of the population is 'unbanked,' with 80% of all transactions still taking place in cash. So the challenge is to take banking to the people," says Mike Jarvis, First National Bank's general manager responsible for information technology. "The business of banking is all about information and being able to deliver that information where and when it is needed."

ON THE HORIZON

Outreach to the black community isn't the only challenge that faces South African banks. The need to broaden the range of personal and corporate services and counter increasing competition from local and international institutions is up there as well. The face of banking is changing. For the first time this year, for example, First National will generate more income from services and transaction fees than from its traditional lending business.

And bank services demand networking. ATMs, branches and remote banking devices on the premises of corporate customers have all become a part of doing business.

First National recently spent 250 million rand (about $56 million)to automate branch offices. The four-year project involved installing more than 10,000 IBM PS/2s and an OS/2 client/server environment at 620 branches; the PCs are interlinked at the branch level on Token Ring LANs and integrated into the bank's national network. The project enabled the bank to centralize routine back-office transaction processing operations so that counter staff, equipped with online systems, can spend their time selling products.

Security trucks *outfitted with modified automated teller machines make the trek to rural KwaZulu Natal to distribute government-funded pensions to retirees*

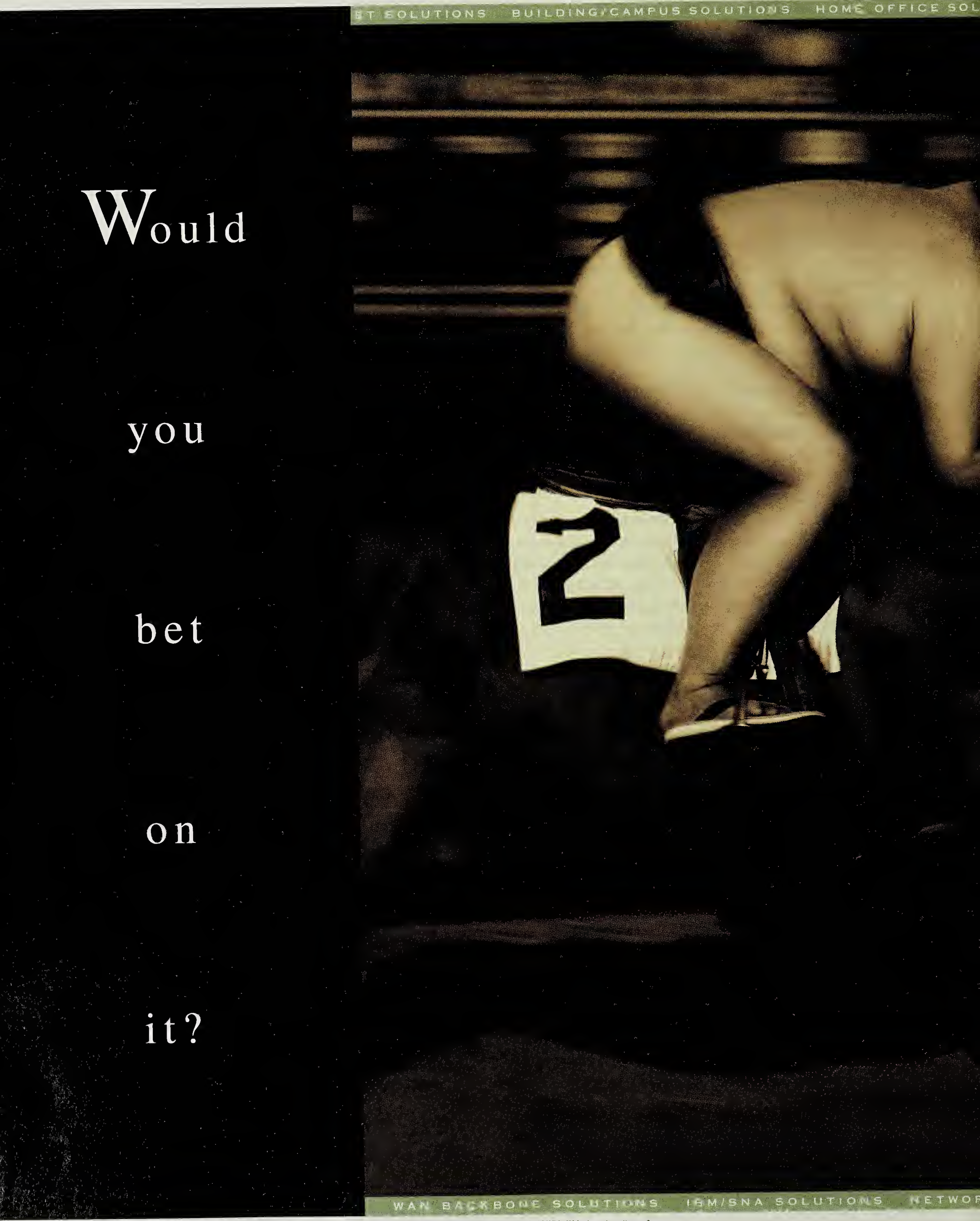
ON A WIDER SCALE

In some instances, the need to offer services has brought the industry together. And cooperation is growing. South Africa's Saswitch national ATM-sharing network enables a customer to access his account by using any of the 6,000 ATMs around the country, regardless of which financial institution holds the account.

Those ATMs are integral to the banking scheme of a nation where most transactions are still conducted in cash. Other services are sometimes a harder sell and call for some creative solutions. How do you approve a loan for someone who doesn't have a credit history? Examine their standing and accountability in the community instead. That's what First National Bank is doing.

It's a challenge. And a step toward economic progress. ●

CASHMORE, *a freelance information technology journalist, is a regular contributor to* Computing South Africa, *an IDG affiliate. He can be contacted at simon.cashmore@it-media.co.za.*



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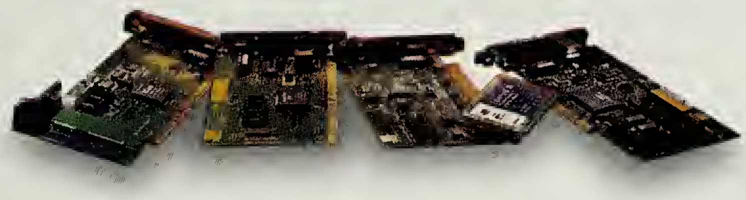

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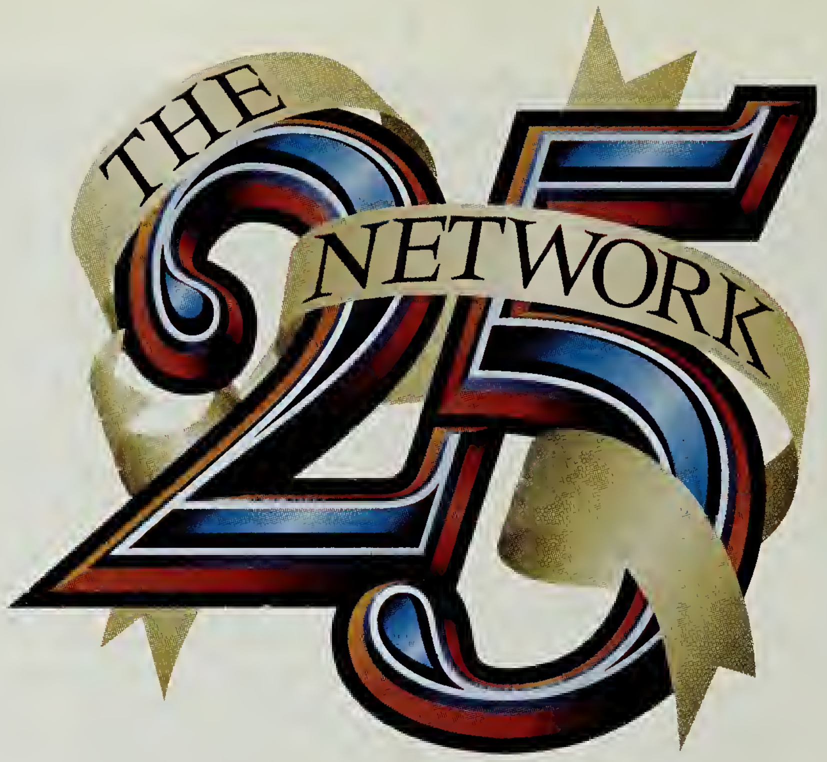
NETWORKS THAT GO THE DISTANCE

THE NETWORK 25 are companies from around the world that use networking in innovative ways. This list, compiled by *Computerworld* and *Network World*, is not a ranking. However, all nominees were surveyed on their information systems and networking expenditures and asked for the breakdown of those budgets. Total spending was one of several factors used in selecting the 25 companies featured. Excerpts from the Network 25 survey results appear in the following charts.



Company	1995 IS spending	1995 network spending	IS staff	Networking staff
ABB	$850M	$250M	35,000	480
Amoco	$401M	$62M	2,409	128
Banco Bradesco	$334M	$112M	1,920	200
Barclays	$145M	NA	6,890	NA

NA=Not available

METHODOLOGY

THE 25 COMPANIES ON THIS LIST were selected through nominations by the editors of *Computerworld* and *Network World* in the U.S. and at sister publications overseas (see page 3). Any organization could be nominated except computer hardware, software and telecommunications companies.

Editors in the U.S. developed a set of seven technology areas by which editors from around the world could evaluate the companies (see page 7). Editors were asked to select companies they believed were outstanding in one or more of these areas and to provide some details for their nominations. Once the nominations were compiled, *Computerworld* researchers asked IS managers at the companies to provide more information for further evaluation. Companies with higher relative spending on networking, for example, were given greater weight.

Also, companies that refused to participate in the survey process were excluded from consideration. This requirement effectively eliminated a number of candidates, including the finalists from Japan.

While we were looking for outstanding companies, we also wanted a fair representation from around the world. Therefore, U.S. companies account for 24% of the list, Europe accounts for 36% and the rest of the world accounts for 40%.

It should be noted that this list is not a ranking, and it is not intended as a definitive list of the "best" networked companies in the world. Rather, it was compiled as a representative list of innovators that are applying networking technology.

Percent spent on LANs	Percent spent on WANs	Percent spent on Internet/intranet
20%	5%	3%
7%	10%	1%
4%	80%	1%
NA	NA	NA

Snapshots

CEMEX

JOSE LUIS LUNA, director of evolution and technology at Cemex, a cement and building aggregates producer in Monterrey, Mexico, has employees devoted to analyzing new technologies. The result: initiatives such as Cemexnet, the company's domestic network established in 1988 to facilitate communication among plants throughout the country. It has since expanded to reach sites in Latin America and Europe. The technology used for the network varies by region. In Latin America, Cemex uses time division multiplexer satellite networks; in Europe, fiber-optic networks. Electronic mail and groupware applications run through these networks, which support TCP/IP, IPX and SNA traffic. A desktop videoconferencing network, now being installed, will connect systems throughout the world via an ISDN gateway, Luna says.

LUNA

FACTOID

CEMEX started one of the first satellite networks in Mexico in 1988.

Cervecerias Quilmes

WITH SIX BREWERIES and four distribution centers, Cervecerias Quilmes is the top brewery in Argentina. Its in-

MORE ☞

Company	1995 IS spending	1995 network spending	IS staff	Networking staff
Benetton	$17M	$2M	150	20
Black & Veatch	$46M	$7M	400	30
Cemex	$30M	$20M	275	40
Cervecerias Quilmes	$5M	$2M	34	15
Charles Schwab	$120M	$70M	560	260
CSX Corp.*	$300M	$81M	1,183	305
Federal Express	$525M	$220M	3,880	320

*Includes CSX Transportation

Percent spent on LANs	Percent spent on WANs	Percent spent on Internet/ intranet
20%	10%	2%
10%	20%	10%
20%	15%	10%
47%	32%	2%
28%	50%	5%
18%	14%	0%
15%	25%	8%

☞ CERVECERIAS QUILMES

ternetworking structure supports 700 sites; its 25 servers handle the business, administrative, production and Internet/intranet systems.

FACTOID

Cervecerias Quilmes was the first company in Argentina with an intranet, says IT chief Aldo Gianelli.

In January, the brewery began an Internet/intranet project that allows it to exchange data with its distributors; it hopes this will improve the flow of information. So far, the intranet is handling 35% of the information on product lists, prices, advertising supplies and the status of accounts and trucks; the rest is conveyed by phone. The brewery plans to have all distributors on the network by the end of the year.

GIANELLI

This type of networking strengthens business relationships. "The distributors perceive that Quilmes is something open. They can interact with the areas they need, whenever they need," says Aldo Gianelli, IT and services chief for the brewery.

FedEx

Federal Express Corp. doesn't waste any time. Ten minutes after a package is delivered, the company's database contains confirmation that the package reached its destination. How is that possible? Start with a network that supports more than 500,000 devices. "All we are is a series of networks, airplanes and vehicles that work together to move the product and information. Every aspect of the business is oriented around the network strategy," says Winn Stephenson, vice president of network computing at the Memphis-based firm.

STEPHENSON

FACTOID

The average number of electronic transmissions a day at FedEx totals more than 45.5 million.

Technology also now allows customers to track their packages without calling FedEx. Based on the size of their company, customers receive a configuration of a system called Powership. A large company, for instance, may have direct electronic data interchange links to a FedEx computer; a smaller office might use Windows-based software. Powership generates labels and places the information in a FedEx database for billing, tracking and tracing, according to Stephenson; 60% to 70% of orders are now processed this way. Eventually, FedEx plans to have 100% of its transactions handled electronically. Users can also connect via the Internet and check a package's status on FedEx's Web site (http://www.fedex.com).

MORE ☞

Company	1995 IS spending	1995 network spending	IS staff	Networking staff
First National Bank	$168M	$29M	1,273	99
Fisher & Paykel	NA	$3M	80	8
Geffen Records	$1M	$1M	7	7
Maruti Udyog Ltd.	$5M	$1M	82	5
Merita Bank	$190M	$50M	600	50
National Computer Board	$108M	$5M	600	30
Petrobras	$375M	$120M	1,969	792

NA=Not available

Percent spent on LANs	Percent spent on WANs	Percent spent on Internet/intranet
25%	61%	0%
50%	25%	2%
50%	10%	15%
34%	2%	1%
60%	25%	2%
85%	13%	2%
20%	40%	1%

Fisher & Paykel

MAIN

If imitation is the sincerest form of flattery, New Zealand's Fisher & Paykel should feel honored. A U.S.-based appliance company emulated Fisher & Paykel's method of compressing product cycle time to reduce cost and improve performance. What enables that method to work is the company's data network, which creates a "flexible real-time scheduling environment," says David Main, network manager. The company manufactures a range of products, including refrigerators, dishwashers, humidifiers and factory control systems.

FACTOID

Fisher & Paykel's whiteware factories are capable of modifying production within 20 seconds.

Using networking technologies such as Asynchronous Transfer Mode, Fiber Distributed Data Interface and Integrated Services Digital Network, Fisher & Paykel's network is flexible. "Our current network configuration provides seamless access for any user to any application/database from anywhere at any time, with constraints placed on access privileges for data security," Main says. Global users range from retail dealers, who use terminals to place orders, to engineers, who use high-powered CAD/CAM systems to design products.

National Computer Board

The National Computer Board's mission is to make Singapore an "intelligent island" by the year 2000. The board, created in 1981 to drive the nation into the Information Age, is now developing a multimedia broadband network called the Singapore One Network for Everyone, or Singapore ONE. The objective is to create an infrastructure that connects several local-access networks so that, effectively, one network links the island. It will carry commercial and governmental services, from high-speed Internet access to teleshopping.

FACTOID

Singapore ONE is "government-encouraged, but industry will build and operate [the infrastructure]," notes Michael Yap, a board director.

"By linking all the government departments, the various value-added networks, the offices and homes electronically, we are moving toward our vision of providing one-stop, nonstop government services to the public," says Goh Beng Tan, a board director.

MORE ☞

Company	1995 IS spending	1995 network spending	IS staff	Networking staff
Peugeot Citroen	$500M	$100M	2,000	40
Schindler Informatik	$90M	$13M	460	36
SmithKline Beecham	$300M	$100M	2,500	100
START Informatik	$127M	$52M	150	100
Swissair	$190M	$45M	880	61
Tempus	NA	$1M	6	14
The Times of India*	$3M	$1M	75	15

* Figures for parent company Bennett, Coleman & Co. NA=Not available.

Percent spent on LANs	Percent spent on WANs	Percent spent on Internet/ intranet
15%	15%	1%
35%	35%	1%
25%	10%	1%
1%	80%	0%
10%	87%	1%
6%	38%	8%
20%	35%	10%

START Informatik

FICHT

Travel agencies in 16,400 locations throughout Germany can book reservations and handle payments for everything from railways to hotels to tours with START Informatik GmbH's travel distribution system, called START. During peak hours, the system handles 318 transactions per second.

The company's WAN is an X.25-based network that connects nearly all of the travel agencies in Germany to START's central system in Frankfurt, says Roland Ficht, head of the production and network division at START Informatik, which handles the networking aspects of the system. The system itself is owned by parent company START Group. The router network has limited TCP/IP connections, though the company is considering increasing the number of connections. It also is considering an intranet, "to increase the efficiency of internal communication and exchange of information," Ficht says.

FACTOID

More than $18 billion worth of tickets, invoices and the like are issued each year via START.

Tempus

It may not be something made out of nothing, but the information network that connects three Bulgarian universities was made out of very little. As EU Tempus project members say, "to design a good network with a bulk sum of money is well done engineering; to design the same network with a lack of money is simply art."

Members of the project, which is part of the European Union program in the Trans-European Cooperation Scheme for Higher Education, used existing equipment but new technologies and mostly donated resources to get started last year. That's when they installed network backbones at the three Sofia-based schools: The Sofia University St. Kliment Ohridski, The Technical University at Sofia and The University of National and World Economy.

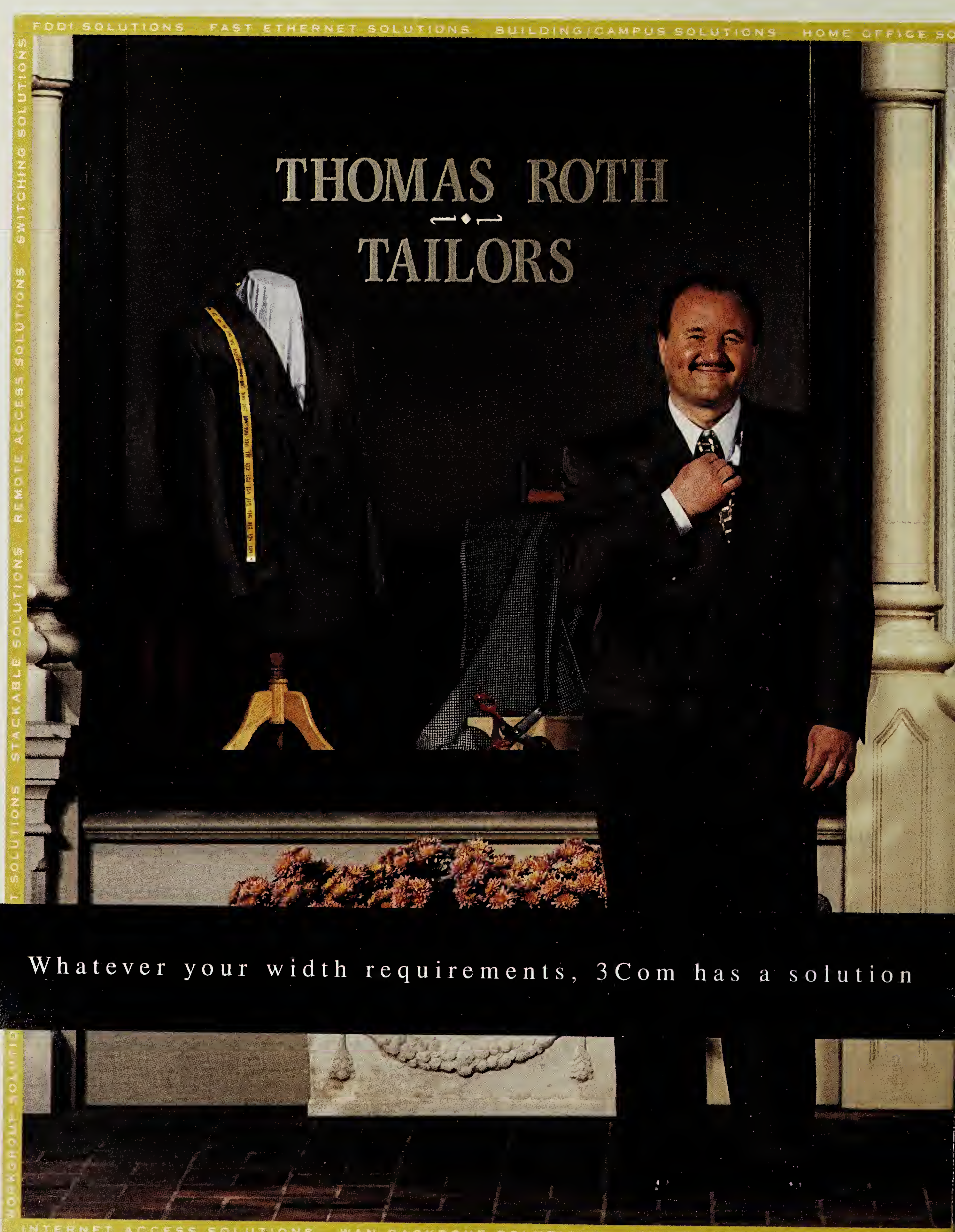
FACTOID

With just $730,000 to connect the universities to the Bulgarian Academic Network and the Internet by 1997, EU Tempus is counting on volunteers and good management.

Now, teachers and students can use the system for educational and research purposes.

The next phase is to connect the schools to the national Bulgarian Academic Network and the Internet. In all, 11 universities and research institutions sponsor the project through donations of money, time and training. ●

Snapshot information *compiled by Amy Malloy.*



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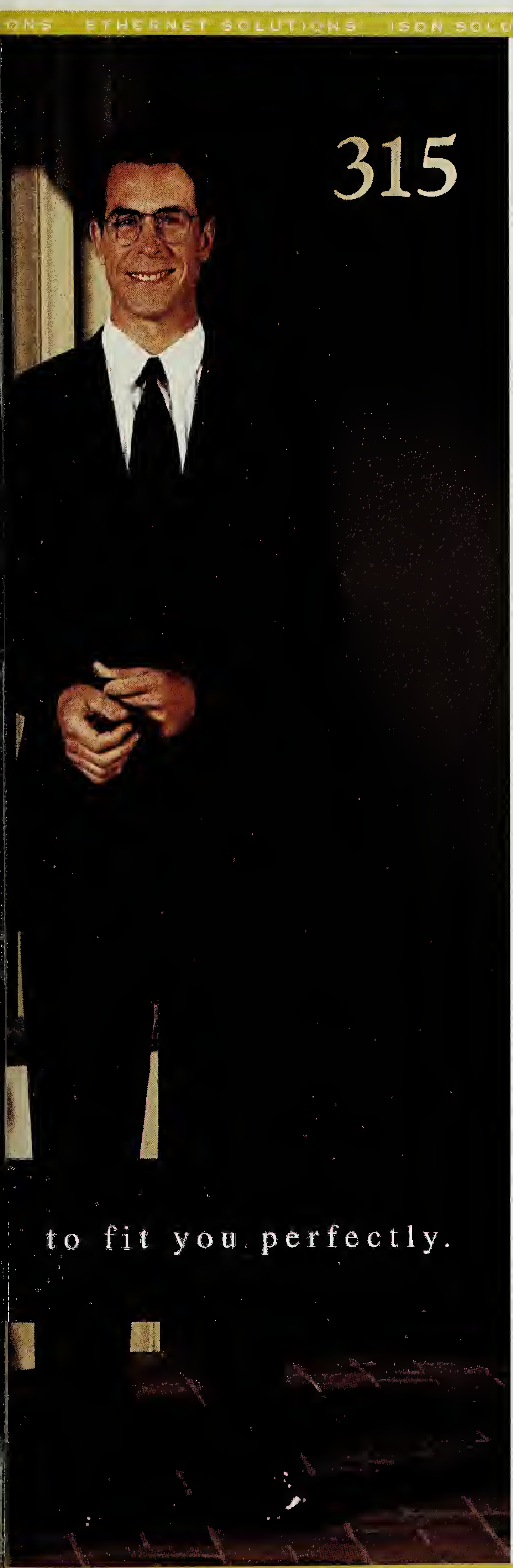

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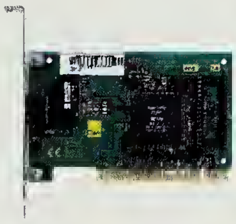

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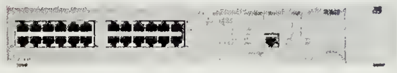

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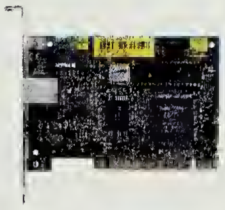

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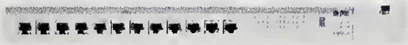

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